数字化城市

实时数据如何改变城市化进程

[DE]CODING THE CITY

How Real-Time Data Changes Urbanism

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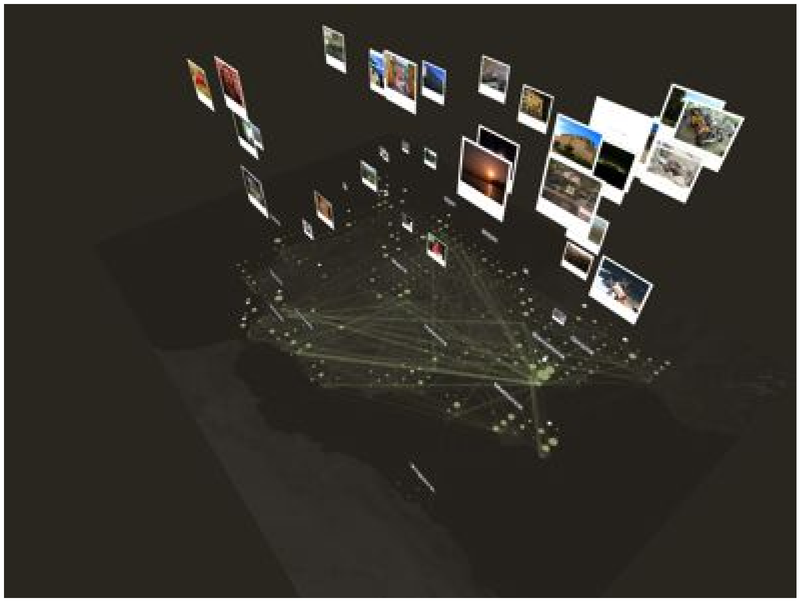
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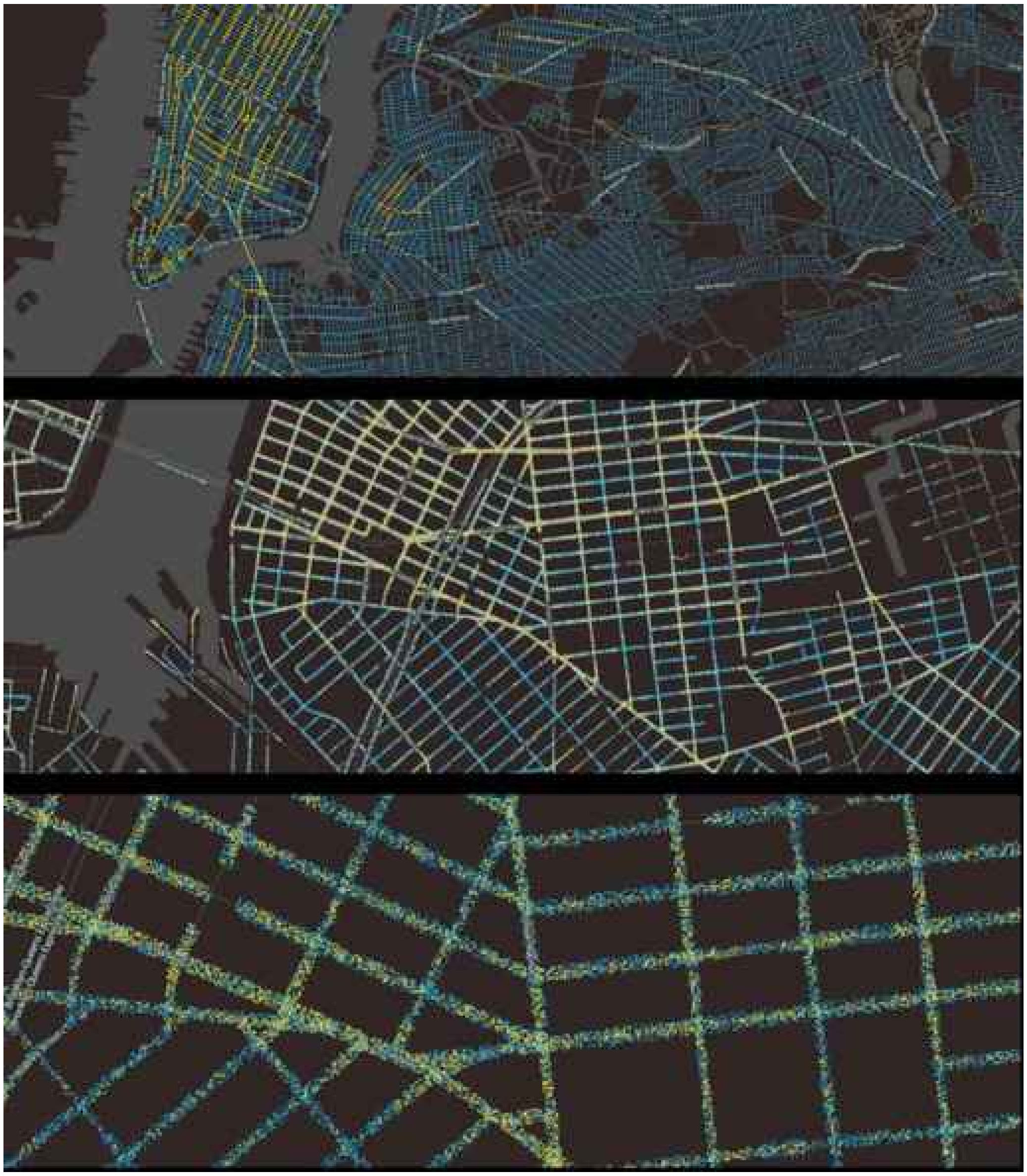
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[illegible]API[illegible]（Application Programming Interface）[illegible]

[illegible]API[illegible]

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1080[illegible][16][illegible]

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[illegible]1963[illegible]1965[illegible]“[illegible]”[illegible]1980[illegible]“[illegible]”[illegible]

[illegible]1981[illegible]NCB[illegible]“[illegible]IT[illegible]”[17][illegible]1986[illegible]IT[illegible]1992[illegible]IT2000[illegible][18][illegible]

“[illegible]15[illegible]”[19]

[illegible][20][illegible]2013[illegible]ICT[illegible]120[illegible]5[illegible]4.8[illegible]26[illegible][21][illegible]“[illegible]”[illegible]

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[illegible]100[illegible]145.24[illegible][22][23][illegible]10[illegible]7[illegible][24][illegible]“[illegible]”[illegible]“[illegible]”[illegible]“[illegible]”[illegible]59.6[illegible]

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[illegible]“[illegible]”[illegible]——[illegible]

[illegible]4.3a[illegible]“[illegible]”[illegible]5[illegible]

表4.3(a)　比较实时数据和非实时数据的用户：你的行程平均愉悦度如何？							
项目	愉悦值（由数据得来）			预期愉悦值（由数据得来）			平均值
	平均值	数据个数	均方差	平均值	数据个数	均方差	差异
步行	3	34	0.7	2.2	20	0.48	-0.8
公共巴士	2.4	68	0.78	2.8	23	0.43	0.4
公共轨交（MRT/LRT）	2.7	70	0.7	2.4	34	0.51	-0.3
出租车	2.8	33	0.77	2.5	14	0.51	-0.3
私家车	3.2	43	0.83	2.6	24	0.5	-0.6
注释　1=不高兴 2=有点不高兴 3=中性 4=有点高兴 5=高兴							

□□4.3a□

□□MRT□Mass Rapid Transition□□□□□□□□LRT□Light Rail Transition□□□5□□□□□□□□□□□□□□□□□□□□□□□□□□100□□□

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□□People's Park Complex□□□□□8□□□□□□Eu Tong Sen Road□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□

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□□□Al-Deek□□□1988□Boyce□1988□Dziekan□Kottnehoff□2007□Dziekan□Vermeulen□2006□Schweiger□2003□□□

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□□MRT□□[25]□

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[illegible]4.6a[illegible]

表 4.6(a) 你有多信任以下的信息源?				
	项目	平均数	数据个数	均方差
移动性	官方公共信息（例如政府）	3.19	124	0.46
	非公共信息（例如私人电视新闻，非政府应用）	2.88	124	0.45
	公众来源	2.56	124	0.59
环境质量	官方公共信息（例如政府）	3.22	120	0.48
	非公共信息（例如私人电视新闻，非政府应用）	2.96	120	0.44
	公众来源	2.49	120	0.57
安全与保密	官方公共信息（例如政府）	320	121	0.5
	非公共信息（例如私人电视新闻，非政府应用）	2.96	121	0.46
	公众来源	2.54	120	0.62
注释 1=总是不信任 2=大多数时间不信任 3=大多数时间信任 4=总是信任				

[illegible]4.6a[illegible]

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[illegible]Paulos[illegible]Honicky[illegible]Hooker[illegible]2008[illegible]

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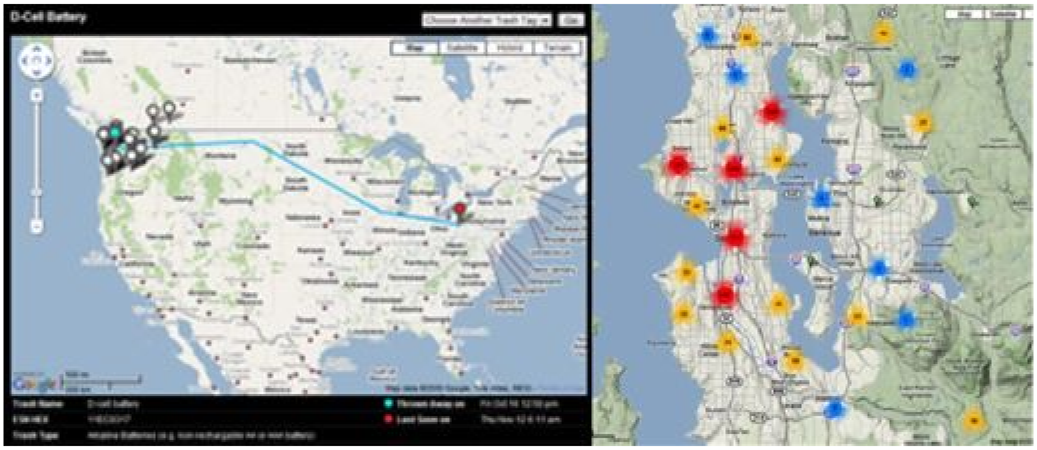
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D-Cell Battery

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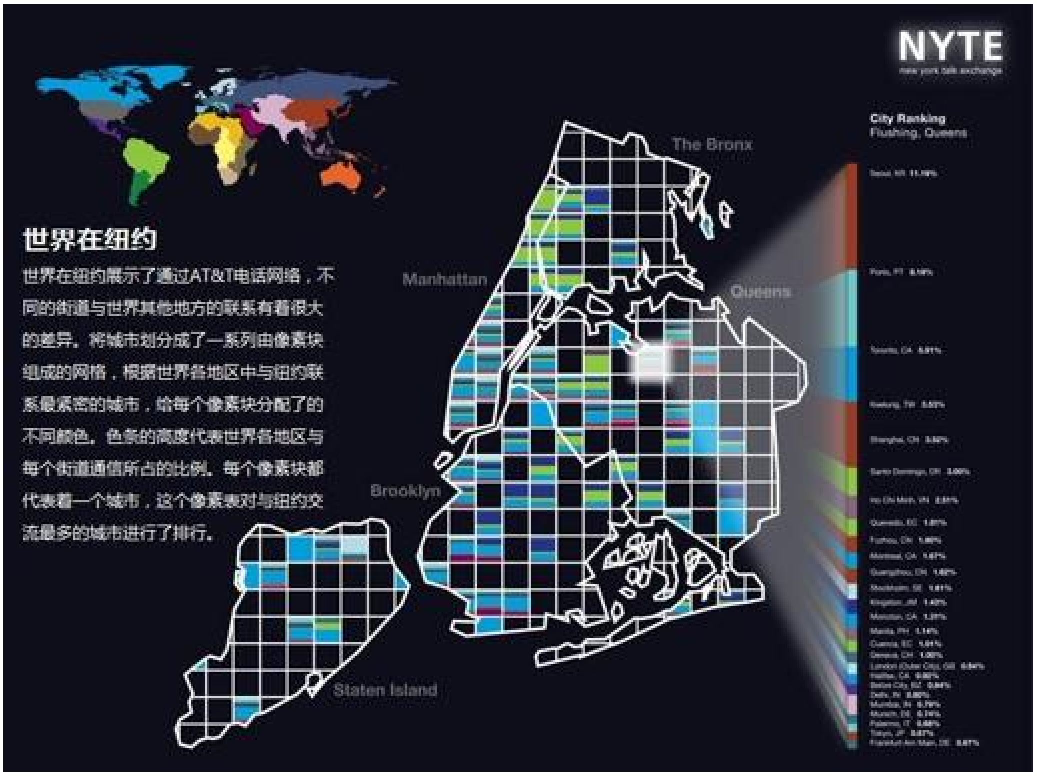
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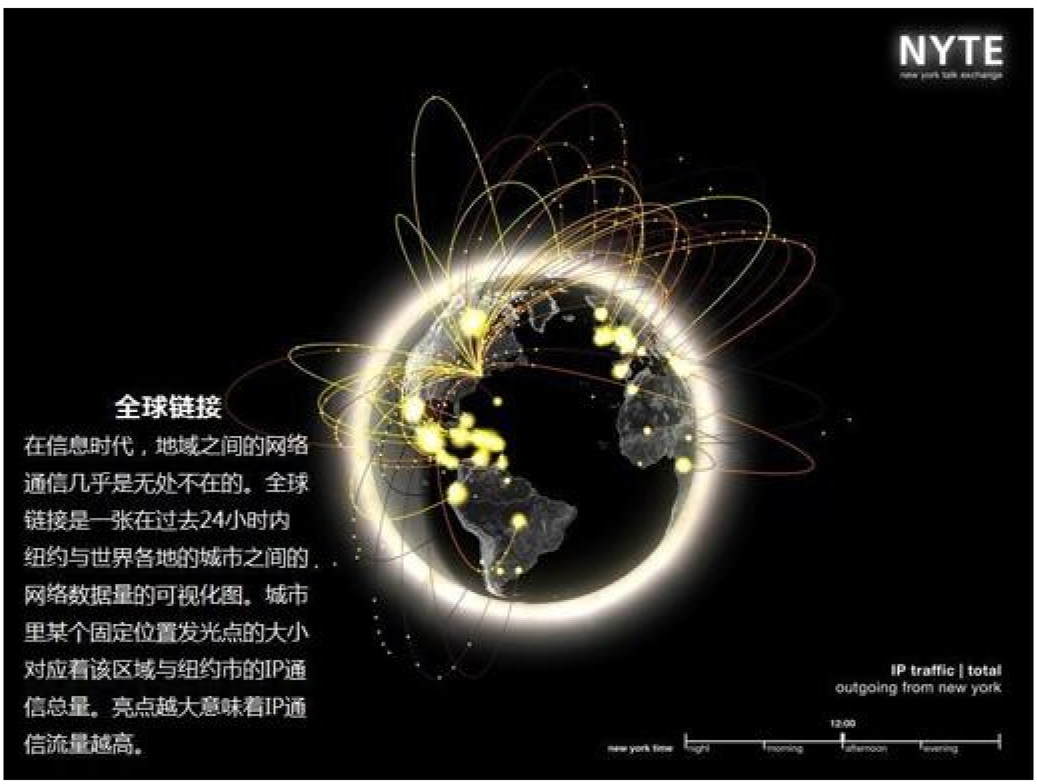
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NYTE
new york talk exchange
City Ranking
Flushing, Queens
The Bronx
Manhattan
Queens
Brooklyn
Staten Island
世界在纽约
世界在纽约展示了通过AT&T电话网络，不同的街道与世界其他地方的联系有着很大的差异。将城市划分成了一系列由像素块组成的网格，根据世界各地区中与纽约联系最紧密的城市，给每个像素块分配了的不同颜色。色条的高度代表世界各地区与每个街道通信所占的比例。每个像素块都代表着一个城市，这个像素表对与纽约交流最多的城市进行了排行。

□□1□


NYTE
new york talk exchange
全球链接
在信息时代，地域之间的网络通信几乎是无处不在的。全球链接是一张在过去24小时内纽约与世界各地的城市之间的网络数据量的可视化图。城市里某个固定位置发光点的大小对应着该区域与纽约市的IP通信总量。亮点越大意味着IP通信流量越高。
IP traffic | total
outgoing from new york
12:00
new york time
night
morning
afternoon
evening

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[illegible] Sassen [illegible] 2001 [illegible] 2002 [illegible] Derudder [illegible] 2008 [illegible] information and communications technology [illegible] ICT [illegible] “[illegible]” [illegible] Levitt [illegible] 2004 [illegible] Vertove [illegible] 2009 [illegible]

[illegible] 10 [illegible] 7 [illegible] 3 [illegible] 1 [illegible] [28] [illegible] GDP [illegible]

排名	国家	世界地区	呼叫地来自纽约 (%)	呼叫地来自美国 (%)	纽约外国出生人口 (%)	美国进口合作伙伴 (%)	美国出口合作伙伴 (%)	人均 GDP (美元)	联系的类型
1	多米尼加共和国	中美洲/ 加勒比地区	11.7	2.3	13.1	0.2	0.5	4,179	M
2	墨西哥	北美	9.1	17.8	6.4	10.8	12	9,516	M/T
3	英国	欧洲	7.5	4	1.2	2.9	4.4	45,510	T
4	加拿大	南美	7	12.2	0.8	16.1	12.9	43,396	T
5	危地马拉	中美洲/ 加勒比地区	5.5	3.2	0.8	0.2	0.4	2,548	M
6	厄瓜多尔	南美洲	5.3	0.8	4.9	0.3	0.3	3,432	M
7	牙买加	中美洲/ 加勒比地区	3.3	1.1	6.3	0	0.2	4,565	M
8	印度	亚洲	3	10.8	2.7	1.3	1.6	947	M/T
9	德国	欧洲	2.5	2	0.8	4.9	4.4	40,308	T
10	菲律宾	亚洲	2.4	3.5	2	0.5	0.7	1,624	M

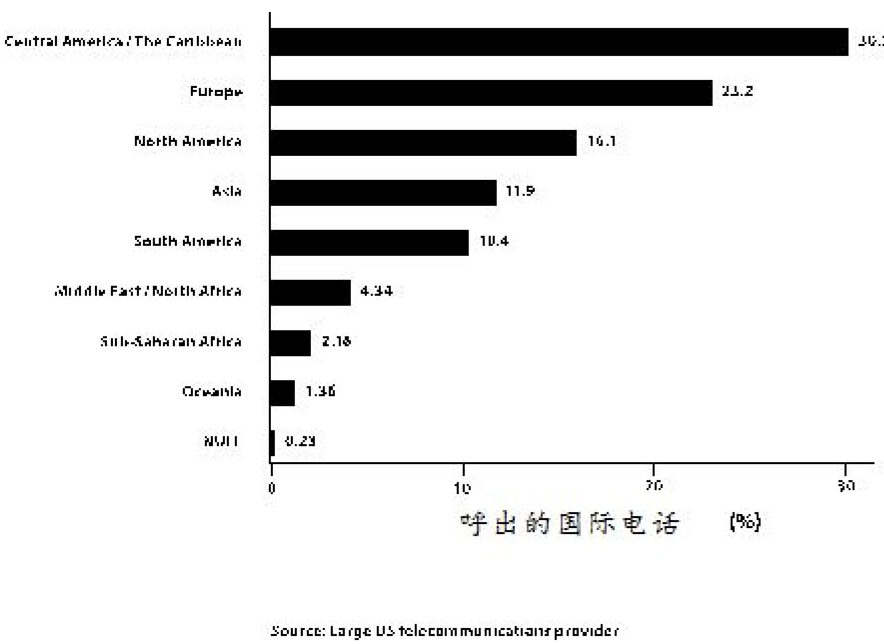
根据2008年9月份纽约市总的国际通话时长，列出排名前10的呼叫地，并与美国2007年总的国际通话时长、来自原籍国的纽约外国出生人口（2006-2008）、美国交易伙伴（2007年）和人均GDP（2007年）做了比较。

注意：M= 移民, T= 贸易, M/T= 移民和贸易伙伴

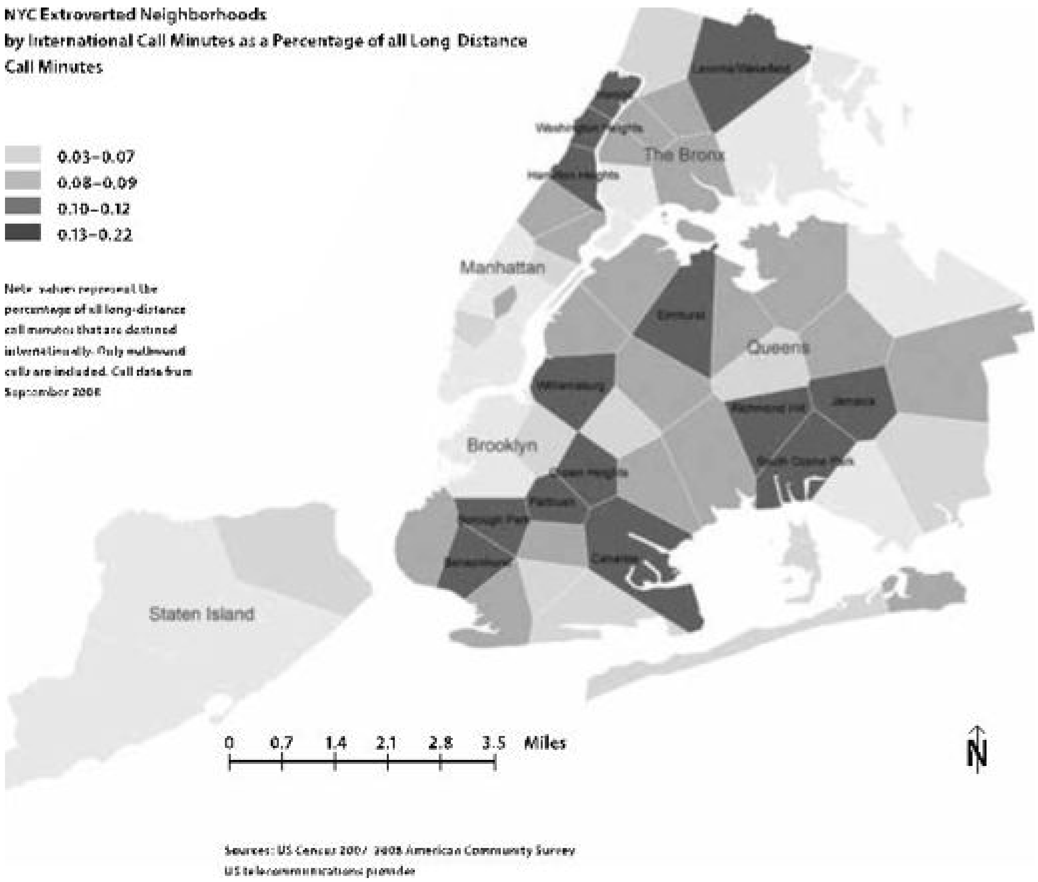
来源：作者采编的数据来自美国一家大型的电信运营商、美国人口统计局2006-2008年美国人口社区普查（ACS），2009年美国联邦通信委员会、国际货币基金组织2008年贸易统计指南、国际电信联盟2007年基本指标

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NYC Extroverted Neighborhoods
by International Call Minutes as a Percentage of all Long Distance
Call Minutes
0.03–0.07
0.08–0.09
0.10–0.12
0.13–0.22
The Bronx
Manhattan
Queens
Brooklyn
Staten Island
Williamsburg
Richmond Hill
Jamaica
Elmhurst
0 0.7 1.4 2.1 2.8 3.5 Miles
N

国际通话目的地通话时长（2008年9月）与纽约市每个行政区中外国出生人口的OLS回归系数					
行政区	布朗克斯	布鲁克林	曼哈顿	皇后区	史坦顿岛
回归系数	0.831*	0.964*	1.026*	0.984*	0.840*
	-0.093	-0.099	-0.09	-0.107	-0.157
常数	1.106	0.134	2.675	0.23	0.802
R平方值	0.55	0.59	0.67	0.56	0.32
N	67	68	69	69	62

注意：括号中的数值是标准误差。

*p < 0.001。

来源：作者分析的数据来自美国一家大型的电信运营商和美国人口统计局2006-2008年美国人口社区普查。

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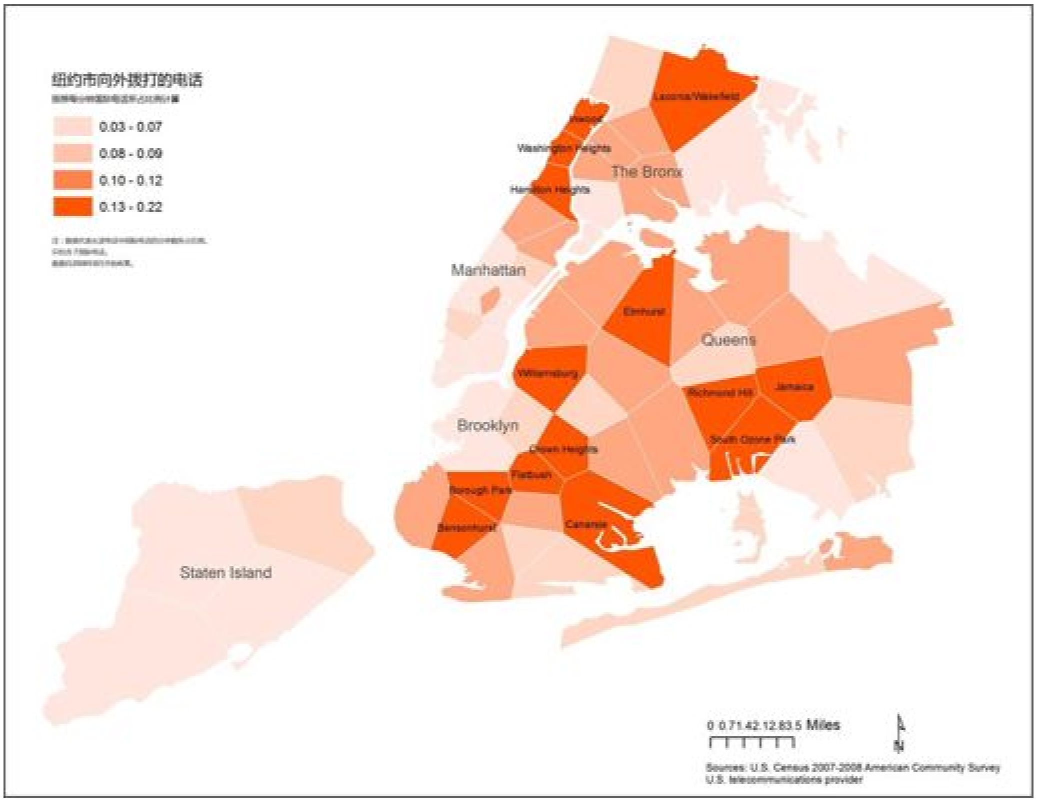
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□□2008□□□□□□□□□□□□□□□□□12□□□□□□□□□□□□□□□64□□□□□14□□□□□□□□□□□□□□□□



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纽约的商业区				纽约的居民区			
街道	行政区	国际通话时间（分钟）	国内通话时间（分钟）	街道	行政区	国际通话时间（分钟）	国内通话时间（分钟）
切尔西区	曼哈顿	5.53	4.95	法拉盛区	皇后区	1.18	0.83
金融区	曼哈顿	2.24	2.67	华盛顿高地	曼哈顿	0.62	0.19
默里山区	曼哈顿	1.46	2.99	茵伍德区	曼哈顿	0.57	0.16
时代广场	曼哈顿	0.93	0.63	艾姆赫斯特区	皇后区	0.57	0.16
曼哈顿西区	曼哈顿	0.72	1.4	科罗娜区	皇后区	0.53	0.4
曼哈顿东区	曼哈顿	0.49	0.55	弗拉特布什区	布鲁克林	0.5	0.15
炮台公园区	曼哈顿	0.38	0.5	威廉斯堡区	布鲁克林	0.5	0.19
基普斯湾	曼哈顿	0.32	0.41	列治文山区	皇后区	0.49	0.16
鲍林格林区	曼哈顿	0.28	0.33	阿里斯托亚区	皇后区	0.47	0.28
克林顿区	曼哈顿	0.2	0.41	牙买加区	皇后区	0.47	0.18

用归一化的国际和国内呼叫的通话量排列了纽约市最外向的区域，并区分了线路中心和街道的类型：主要商业区或居民区。

注意：国际通话时长用人口数量做了归一化，估计了该美国电信运营商的市场份额，并根据所有线路中心的人均通话量做了索引。

来源：作者分析的数据来自美国一家大型的电信运营商。

[illegible]3[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]6[illegible]——[illegible]38,320[illegible]38,320[illegible]71,850[illegible]71,850[illegible]——[illegible][32][illegible]

变量解释	模型 1	模型 2	模型 3	模型 4
低等家庭收入	0.04**	0.04**	0.04**	0.04***
(低于 38,320美元)	-0.02	-0.02	-0.01	-0.01
高等家庭收入	-0.04*	0	0	0
(高于 71,850美元)	-0.02	-0.02	-0.02	-0.02
外国出生人口比例 (%)		0.20***	0.23***	0.22***
		-0.04	-0.06	-0.06
外语使用者比例(%)			-0.04	-0.04
			-0.05	-0.05
家庭数量				2.59-07
				(2.11-07)
常数	0.09**	0.02	0.03	0.02
	-0.01	-0.02	-0.02	-0.02
R平方值	0.22	0.44	0.44	0.46
N	60	60	60	60

国际通话时间占总的长途电话比例与纽约市街道的低等和高等家庭收入、外国出生人口比例、外语使用者比例和家庭数量的OLS回归系数

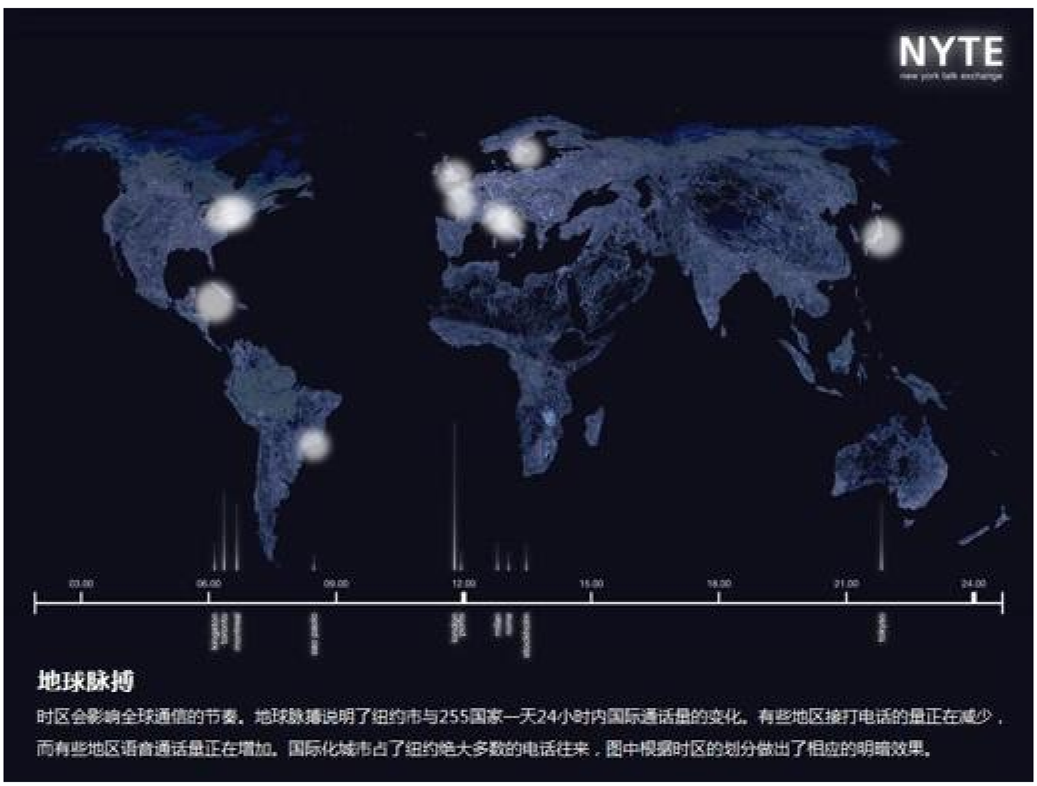
注意：括号中的数值是标准误差。

*p<0.05， **p<0.01， ***p<0.001。

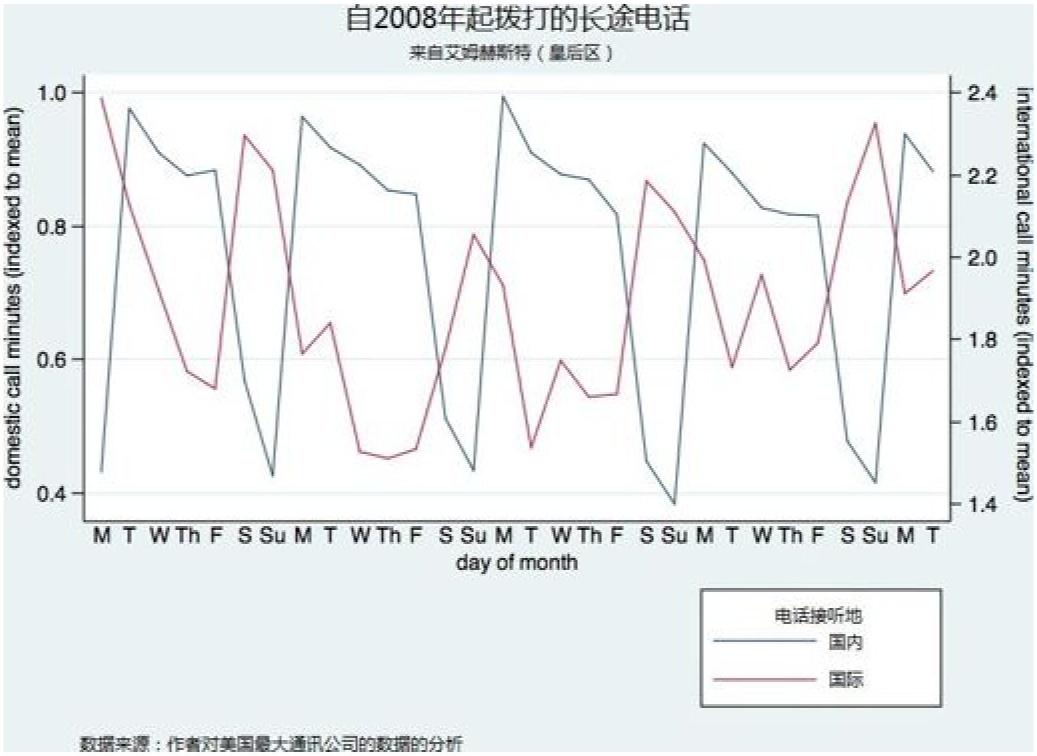
来源：作者分析的数据来自美国一家大型的电信运营商（2008年9月）和2007-2008年美国人口社区普查（ACS）

□□4□

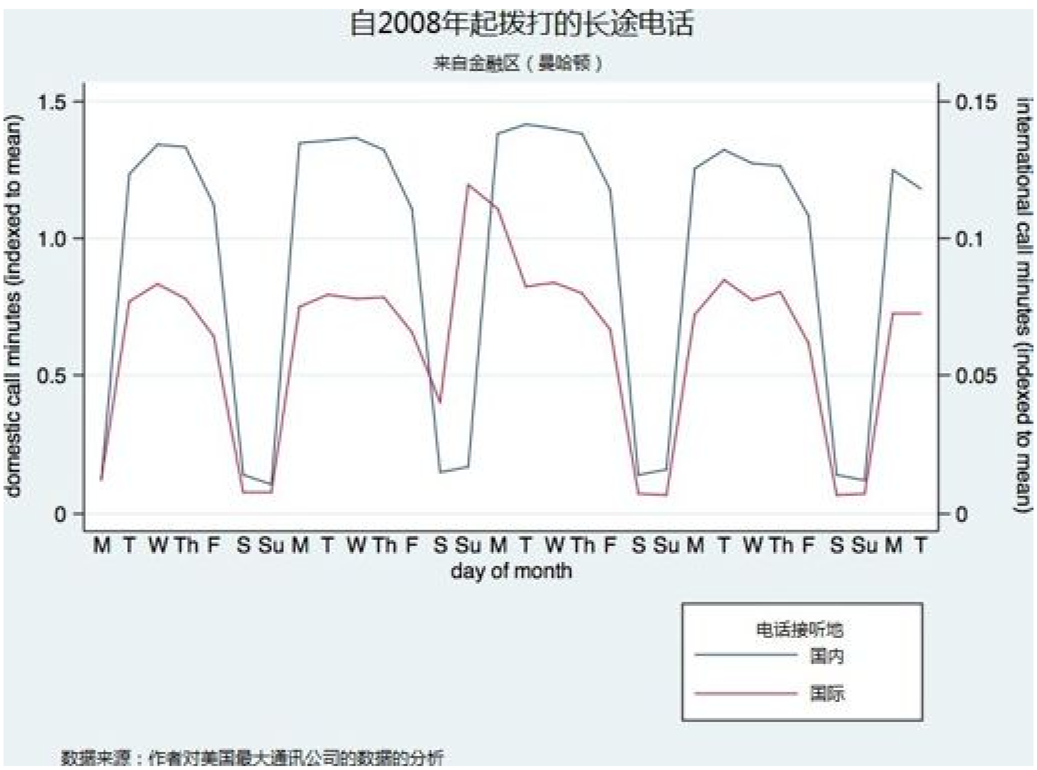
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NYTE
new york talk exchange
03.00
06.00
09.00
12.00
15.00
18.00
21.00
24.00
地球脉搏
时区会影响全球通信的节奏。地球脉搏说明了纽约市与255国家一天24小时内国际通话量的变化。有些地区接打电话的量正在减少，
而有些地区语音通话量正在增加。国际化城市占了纽约绝大多数的电话往来，图中根据时区的划分做出了相应的明暗效果。

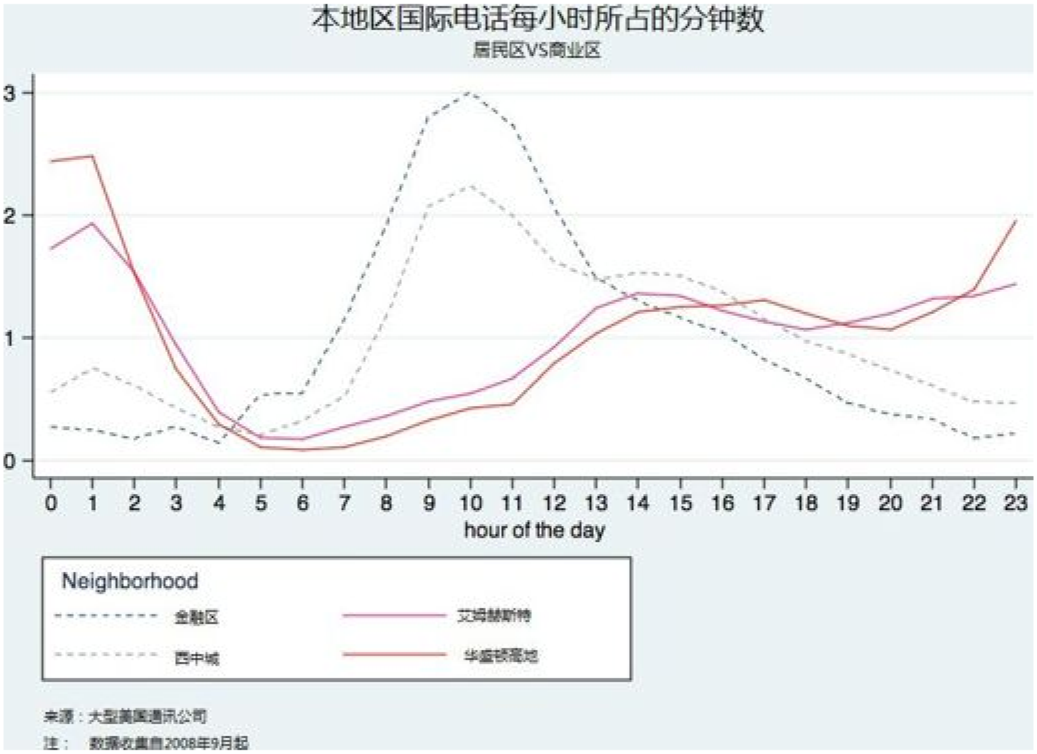
□□6□


自2008年起拨打的长途电话
来自艾姆赫斯特（皇后区）
domestic call minutes (indexed to mean)
international call minutes (indexed to mean)
1.0
0.8
0.6
0.4
2.4
2.2
2.0
1.8
1.6
1.4
M T W Th F S Su M T W Th F S Su M T W Th F S Su M T W Th F S Su M T
day of month
电话接听地
国内
国际
数据来源：作者对美国最大通讯公司的数据的分析

□□7□


自2008年起拨打的长途电话
来自金融区（曼哈顿）
domestic call minutes (indexed to mean)
international call minutes (indexed to mean)
1.5
1.0
0.5
0
0.15
0.1
0.05
0
M T W Th F S Su M T W Th F S Su M T W Th F S Su M T W Th F S Su M T
day of month
电话接听地
国内
国际
数据来源：作者对美国最大通讯公司的数据的分析

□□8□



[illegible]9[illegible]

[illegible]9[illegible]9[illegible]“[illegible]”[illegible]9[illegible]12[illegible]11[illegible]2[illegible]

[illegible]——[illegible]——[illegible]

[illegible]“[illegible]”[illegible]19[illegible]60[illegible][33][illegible]

[illegible]

[illegible]

[illegible]ICT[illegible]20[illegible]ICT[illegible]Castells[illegible]1996[illegible]ICT[illegible]21[illegible]

[illegible]“[illegible]”[illegible]

[illegible]21[illegible]——[illegible]ICT[illegible]——[illegible]30[illegible]2004[illegible]

[illegible]

[illegible]2010[illegible]AT&T[illegible]·[illegible]Francesco Calabrese[illegible]·[illegible]Jon Reades[illegible]——[illegible]·[illegible]

□Frank Levy□□□□□·□□□□Manuel Castells□□□□·□□□Carlo Ratti□□□——□□□□□□□□

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[1] 2008□□□□□□□□□□□□·□□□□□Olafur Eliasson□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□37□□□□□□□□□□□□□□□□□□□□□□□□□□□□1,500□□□□□□□□□□□□5,500□□□□□□□□□□□□□

[2] [illegible]vantage points of the[illegible]

[3] “[illegible]”[illegible]reality mining[illegible]GPS[illegible]

[4] [illegible]“[illegible]”[illegible]large-scale top-down big brother threat on privacy issues[illegible]·[illegible]1984[illegible]“[illegible]”[illegible]more local bottom-up little sister types of people monitoring[illegible]“[illegible]”[illegible]·[illegible]“[illegible]”[illegible]

[5] Open311: http://open311.org

[6] [illegible]http://oad.simmons.edu/oadwiki/Data_repositories

[7] OpenStreetMap: www.openstreetmap.org

[8] [illegible] 2011 [illegible] 3 [illegible] 5 [illegible] http://www.nytimes.com/2011/03/05/science/05legal.html

[9] [illegible] iPhone [illegible] http://radar.oreily.com/2011/04/apple-location-tracking.html

[10] [illegible]crowdflow. net[illegible]

[11] [illegible]1: 12-cv-00784-LAK, Aka Carniol v. Yassky[illegible]

[12] Moovel: http://www.moovel.com

[13] [illegible]“[illegible]”[illegible]“[illegible]”[illegible]GPS[illegible]“[illegible]”[illegible]“[illegible]”[illegible]

[14] Golder and Macy

[15] Williams, Robles, and Dourish, 2008.

[16] Pike Reasearch, 2010.

[17] Transit Watch, 2000.

[18] Transit Watch, 2000.

[19] NCB, 1992.

[20] You, 1991.

[21] Infocomm Development Agency, 2005.

[22] Department of Statistics Singapore, 2012

[23] [illegible]100[illegible]90.78[illegible]100[illegible]179.39[illegible]

[24] Department of Statistics Singapore, 2012

[25] Ito, et al, 2005

[26] "The full ST interview ...", 2011

[27] [illegible]FCC[illegible]2007[illegible]2004[illegible]1/4[illegible]

[28] [illegible]TeleGeography[illegible]

[29] [illegible]

[30] [illegible]3[illegible]223[illegible]2006[illegible]2008[illegible]69[illegible]

[31] [illegible]33[illegible]32[illegible]

[32] [illegible]47,900[illegible]80[illegible]≤38,320[illegible]80[illegible]150[illegible]38,320[illegible]71,850[illegible]150[illegible]≥71,850[illegible]2006[illegible]Booza[illegible]

[illegible]33[illegible][illegible]

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[illegible]——[illegible]

[illegible]（environmental information）[illegible]

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[illegible]

[illegible]（dynamics）[illegible]5,076,700[illegible]2010[illegible]710.2[illegible]

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□□□□□□□□□□□□□□□□87□□□□130□□□□□□□□□□□□□□□□

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[illegible]“[illegible]”[illegible]“[illegible]”（Taylor, 2001, p.139[illegible]

[illegible]

[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]

[illegible]（feedback loop）

[illegible]·[illegible]（Jay Forrester）[illegible]“[illegible]”（Forrester, 1961, p.61）“[illegible]”[illegible]（Forrester, 1961, p.61）[illegible]

[illegible]·[illegible]（Donella Meadows）[illegible]——“[illegible]”（Meadows, 2008, p.17）[illegible]

[illegible]

[illegible] Data Visualizations [illegible]“[illegible]……[illegible]”（Meadows, 2008, p.5[illegible]

“[illegible]”[illegible]



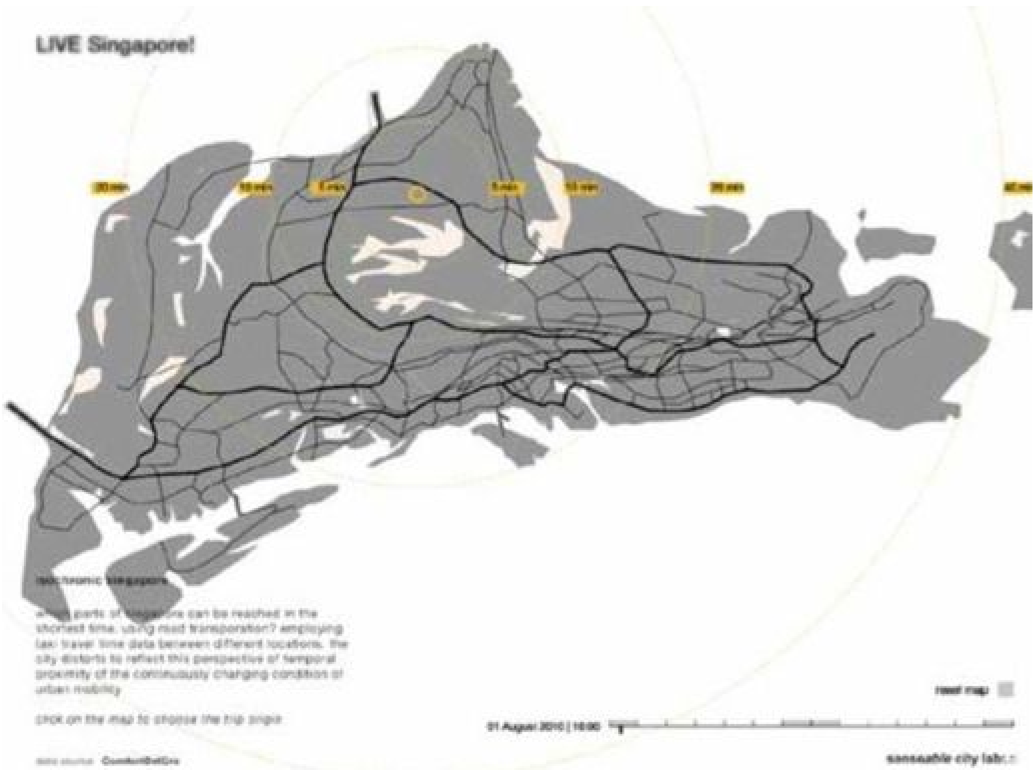
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“[illegible]”[illegible]

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□□2□□□Isochronic□□□□——□□□□□□□□□□□□□□□□16,000□□□□□□□GPS□□□——□□□□□□□□□□□□□□□□□

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[illegible]Land transport authority[illegible]2012[illegible]“[illegible]”[illegible]

[illegible]TOUCHING BUS RIDES[illegible]“[illegible]”[illegible]

[illegible]

[illegible]30[illegible]

[illegible]

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[illegible]

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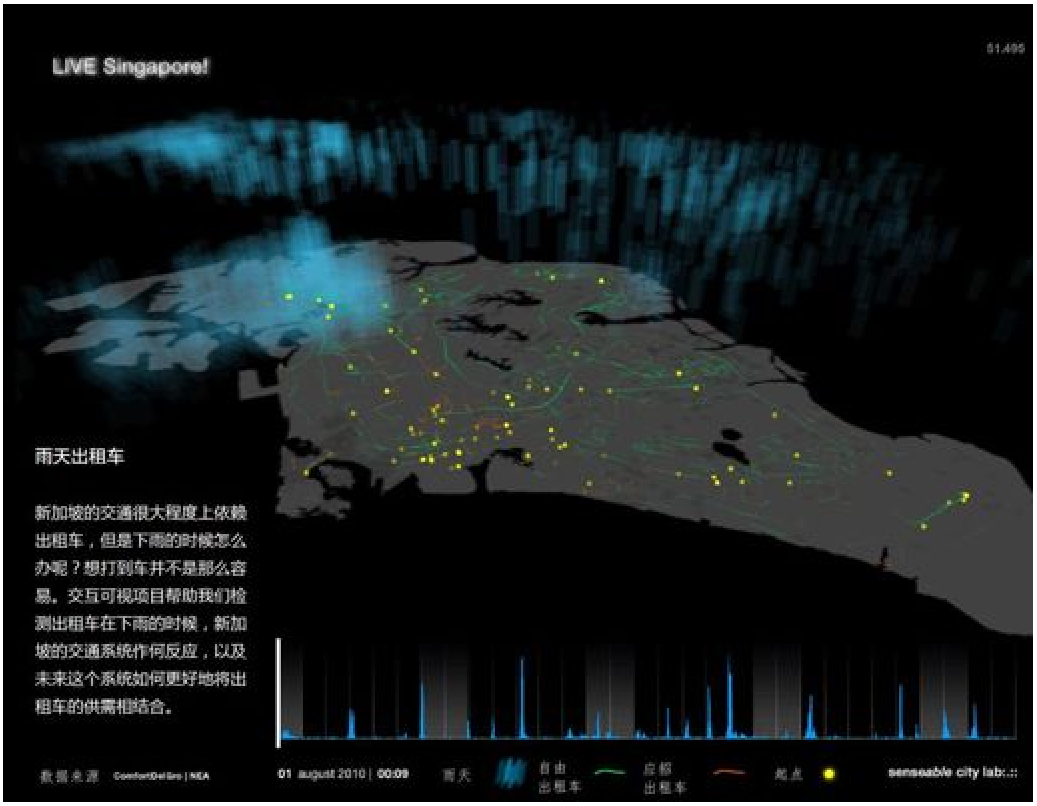
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[illegible]ChangiNow[illegible]

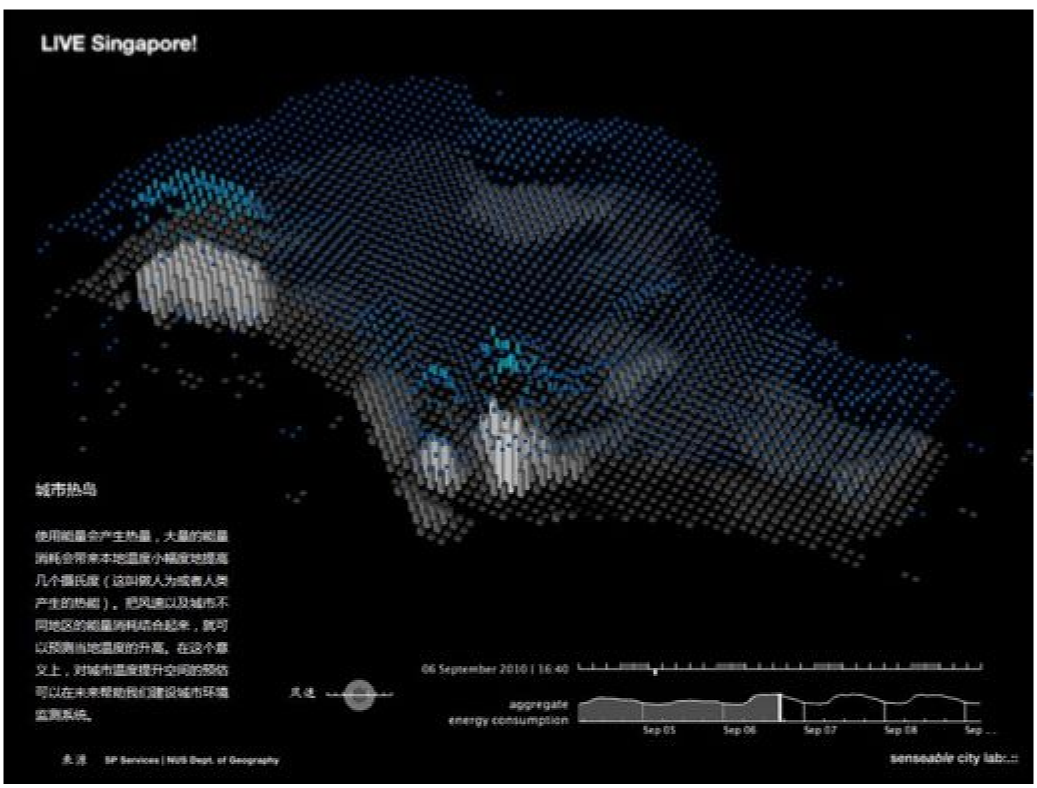
[illegible]“[illegible]”[illegible]

[illegible]“[illegible]”[illegible]“[illegible]”[illegible]Star & James, 1989[illegible]

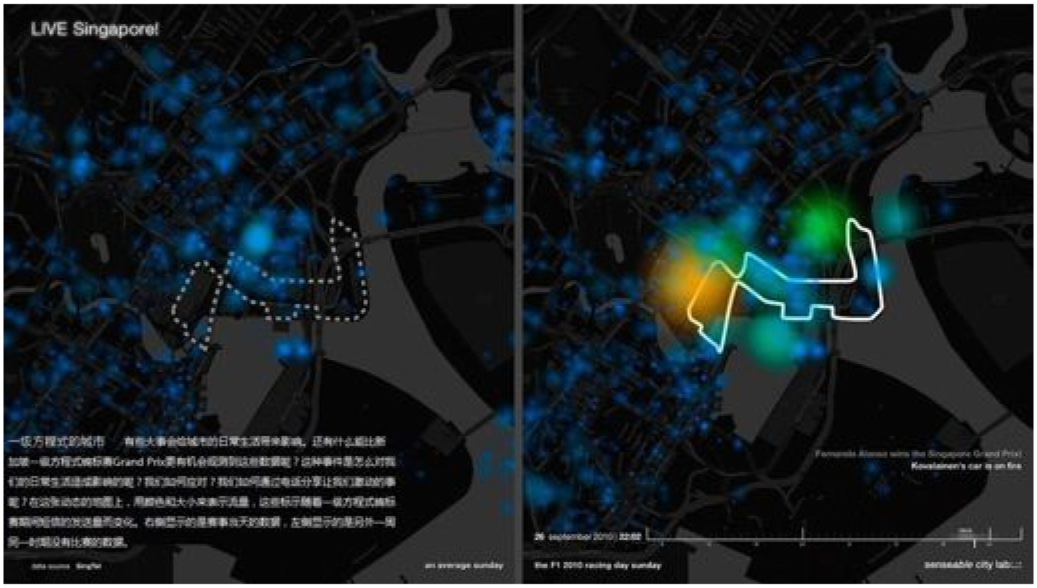
[illegible]


LIVE Singapore!
雨天出租车
新加坡的交通很大程度上依赖出租车，但是下雨的时候怎么办呢？想打到车并不是那么容易。交互可视项目帮助我们检测出租车在下雨的时候，新加坡的交通系统作何反应，以及未来这个系统如何更好地将出租车的供需相结合。
数据来源 ComfortDelGro | NEA
01 august 2010 | 00:09
雨天
自由出租车
应招出租车
起点
senseable city lab:.::

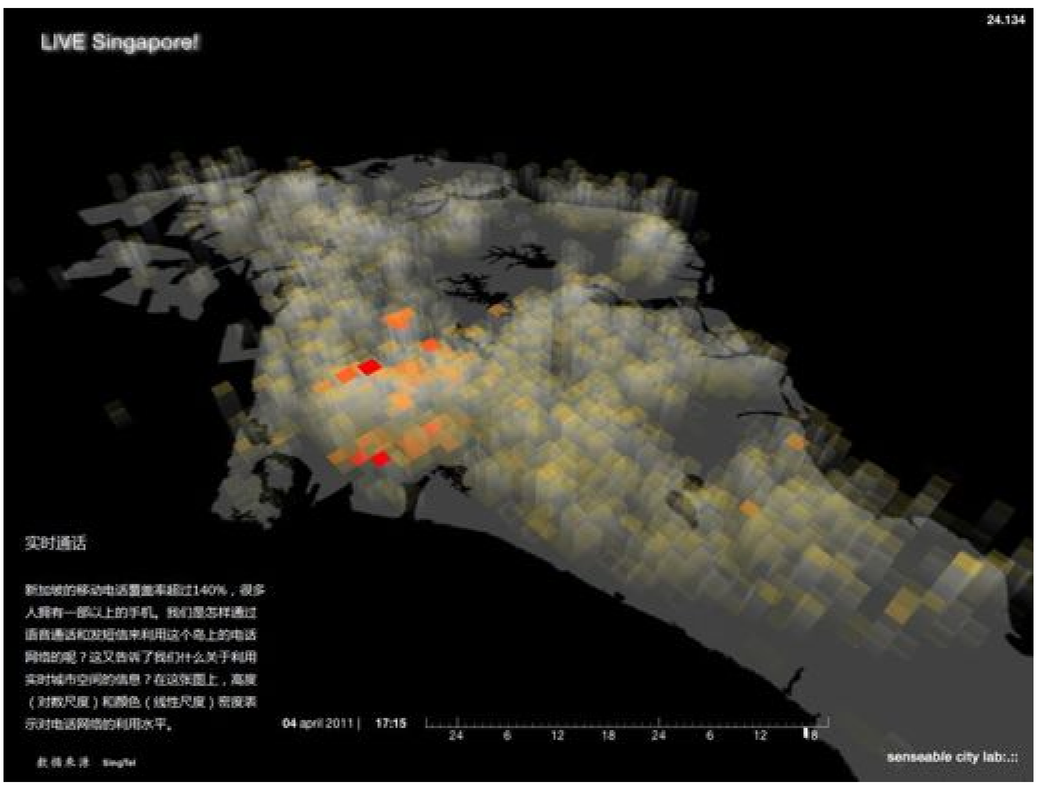
□□3□


LIVE Singapore!
城市热岛
使用能量会产生热量，大量的能量消耗会带来本地温度小幅度地提高几个摄氏度（这叫做人为或者人类产生的热能）。把风速以及城市不同地区的能量消耗结合起来，就可以预测当地温度的升高。在这个意义上，对城市温度提升空间的预估可以在未来帮助我们建设城市环境监测系统。
风速
06 September 2010 | 16:40
aggregate energy consumption
Sep 05
Sep 06
Sep 07
Sep 08
来源 SP Services | NUS Dept. of Geography
senseable city lab:.::

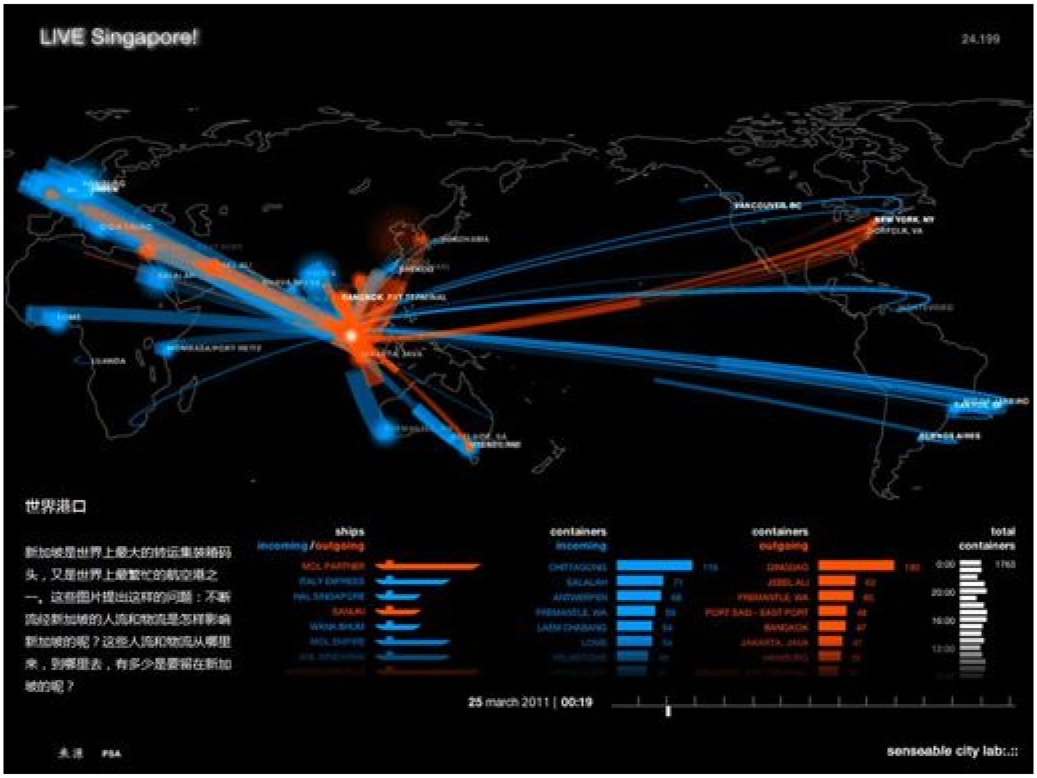
□□4□


LIVE Singapore!
Kowalainen's car is on fire
the F1 2010 racing day sunday
senseable city lab:::

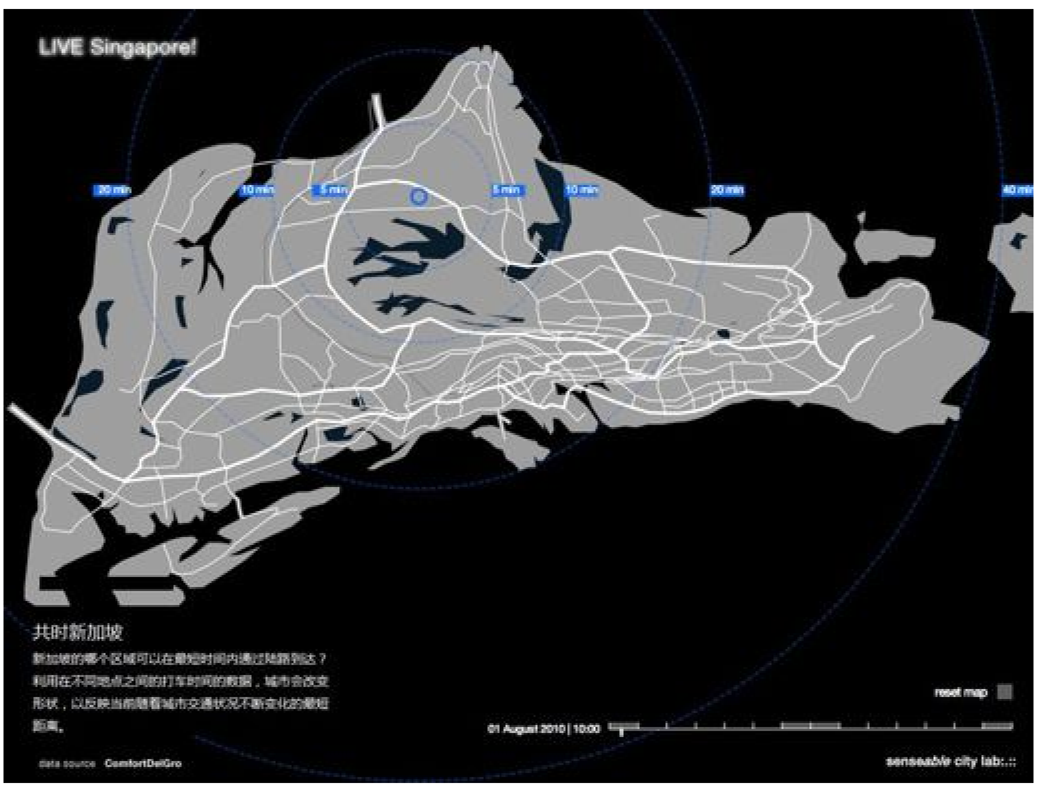
图（5）


LIVE Singapore!
24.134
实时通话
新加坡的移动电话覆盖率超过140%，很多人拥有一部以上的手机。我们是怎样通过语音通话和发短信来利用这个岛上的电话网络的呢？这又告诉了我们什么关于利用实时城市空间的信息？在这张图上，高度（对数尺度）和颜色（线性尺度）都被表示对电话网络的利用水平。
04 april 2011 | 17:15
24 6 12 18 24 6 12 18
senseable city lab:::

图（6）


LIVE Singapore!
24.199
世界港口
25 march 2011 | 00:19
senseable city lab:.::

□□7□


LIVE Singapore!
20 min
10 min
5 min
5 min
10 min
20 min
共时新加坡
reset map
01 August 2010 | 10:00
data source ComfortDelGro
senseable city lab:.::

□□8□

□□□□

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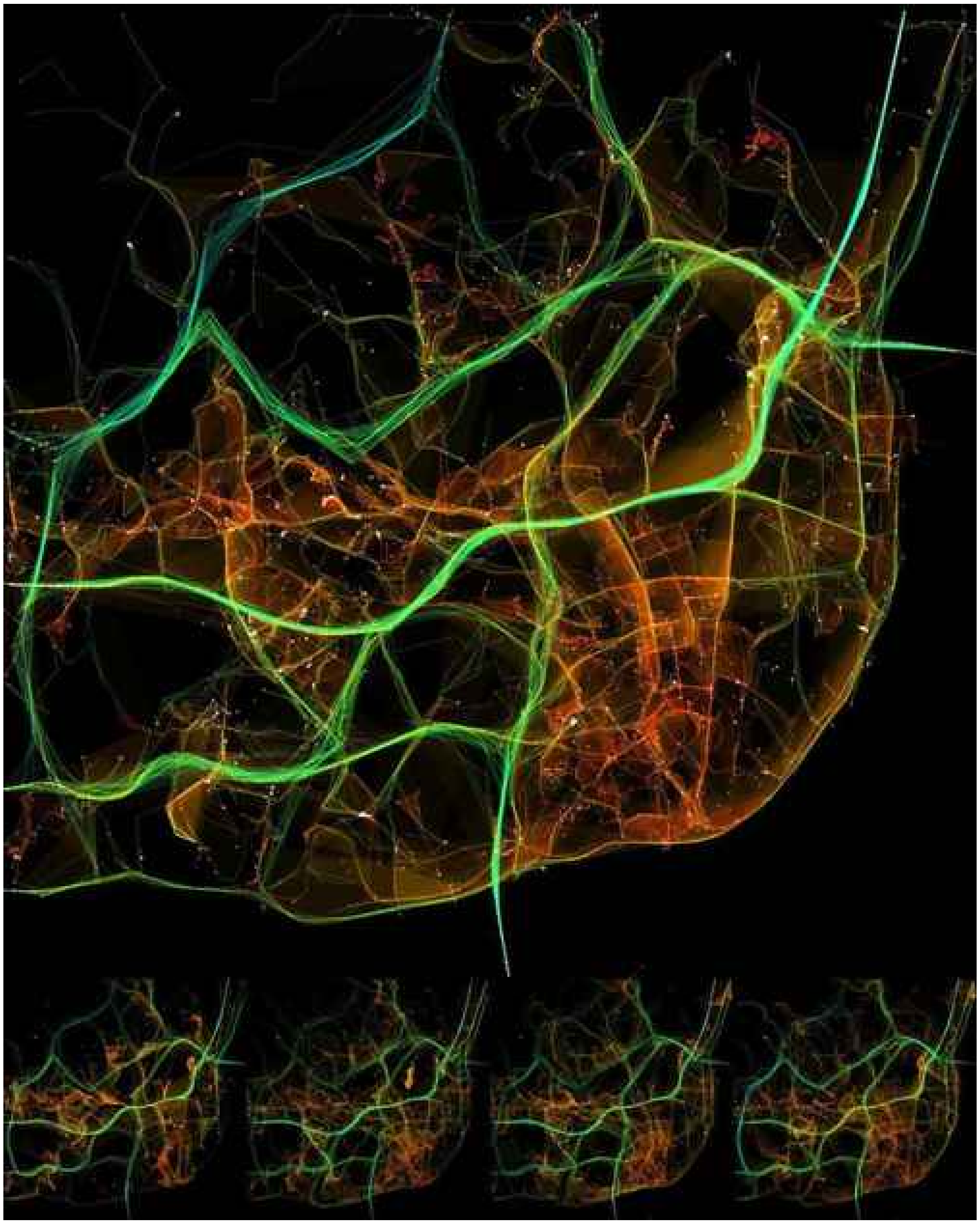
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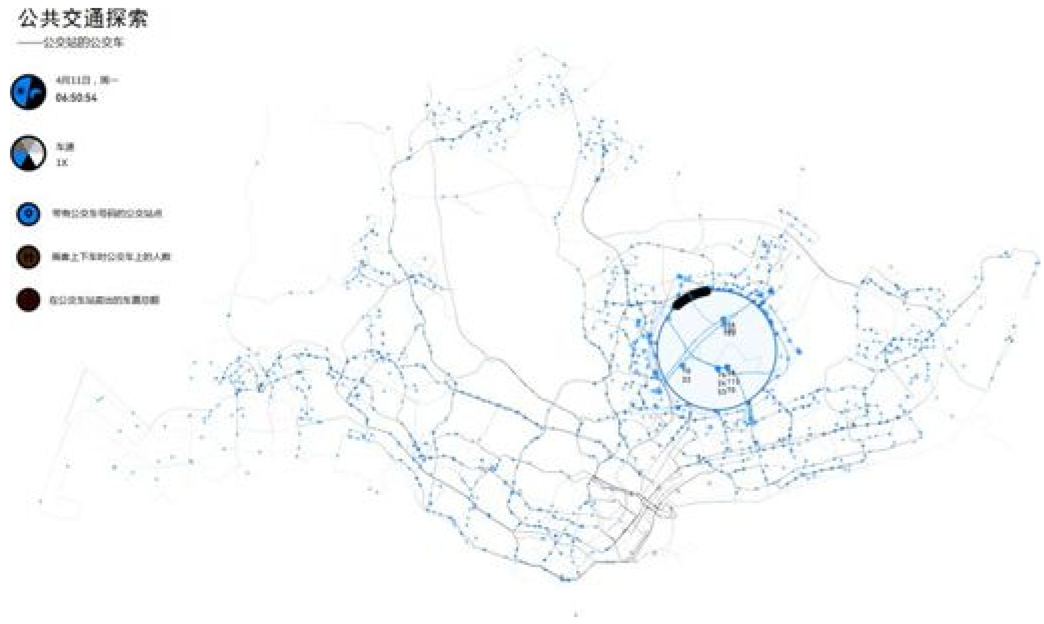
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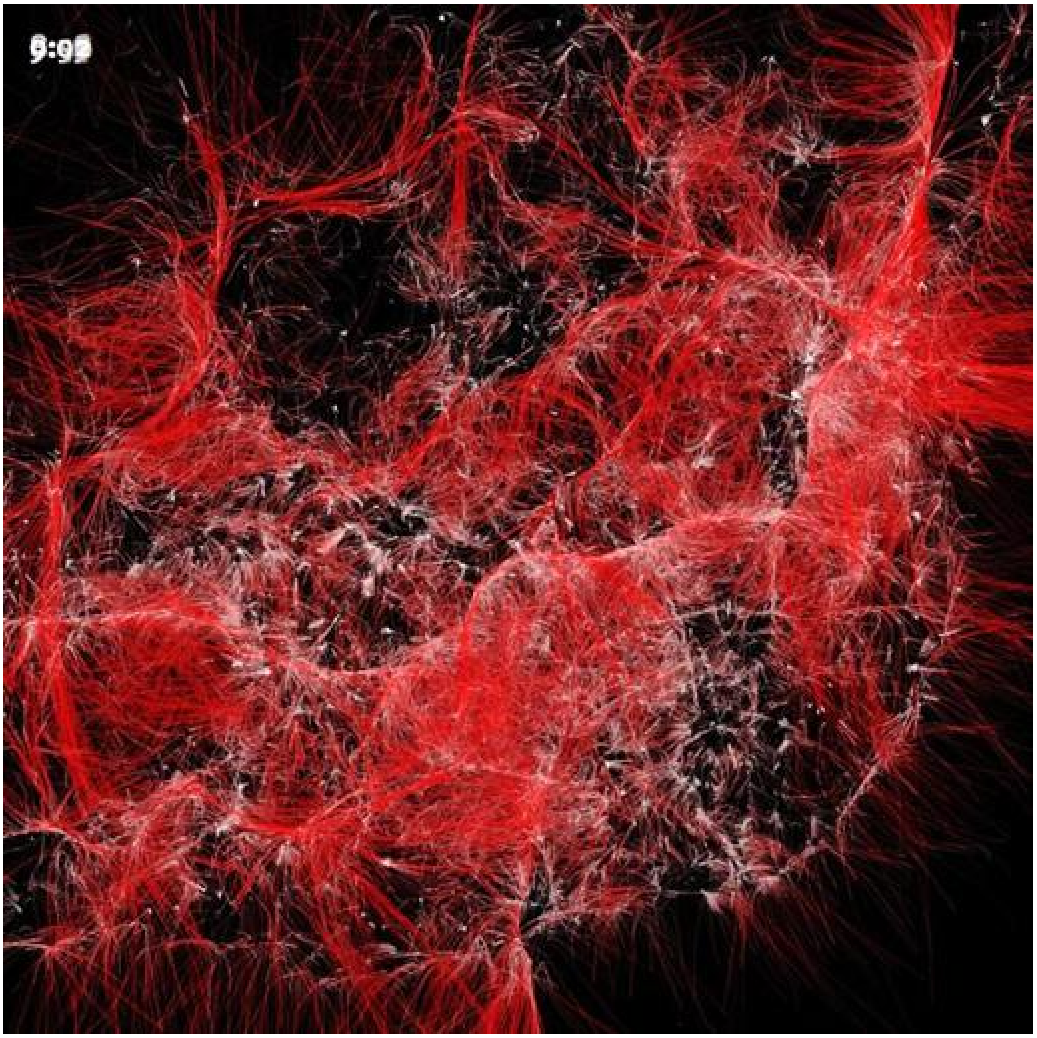
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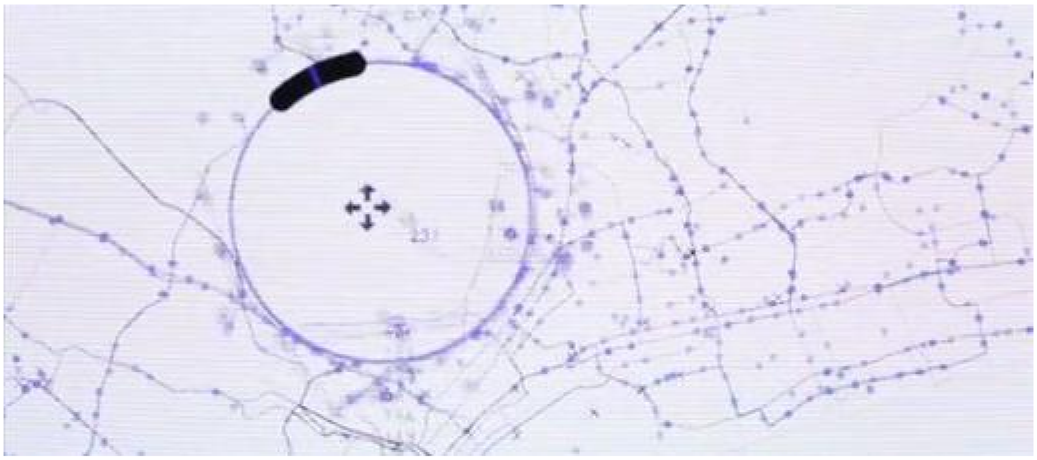
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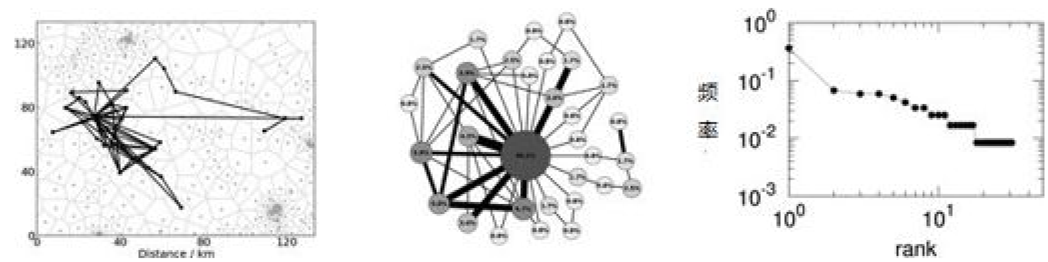
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$$r_g = \sqrt{\frac{1}{L}\sum_{i=1}^{L}\left(\vec{r}_i - \vec{r}_{cm}\right)^2} \qquad (1)$$

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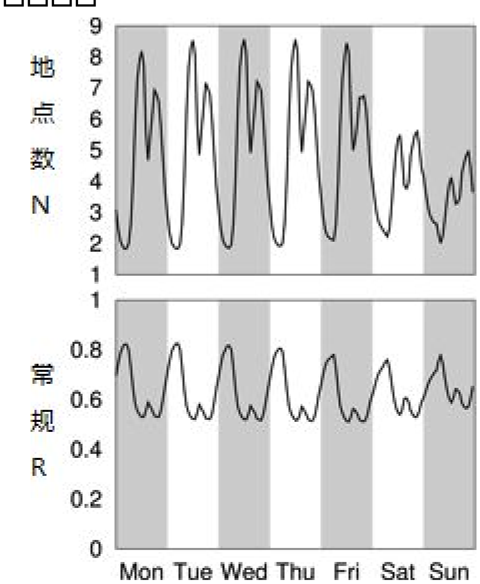
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$$\vec{r}_{cm} = L^{-1}\sum_{i=1}^{L}\vec{r}_i.$$

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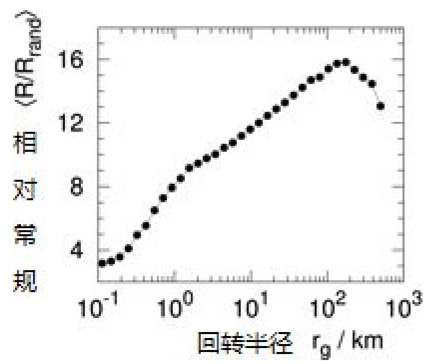


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$$R1=\frac{出现在主要地点的次数}{出现的总次数} \quad (2)$$

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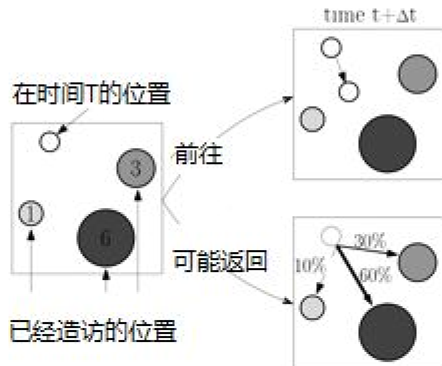
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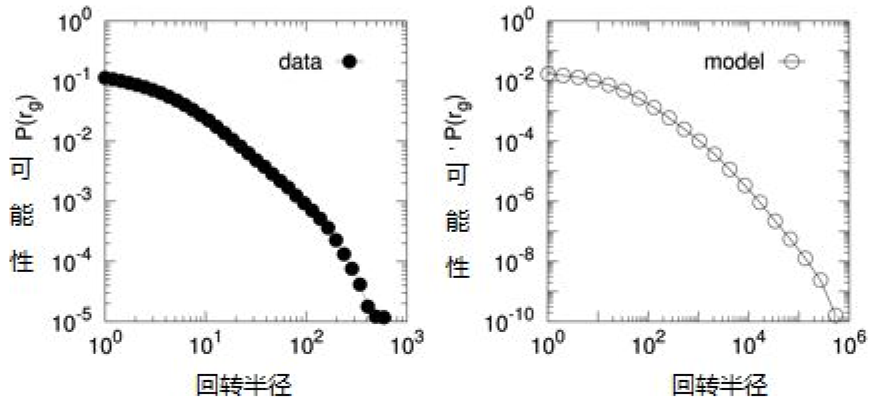
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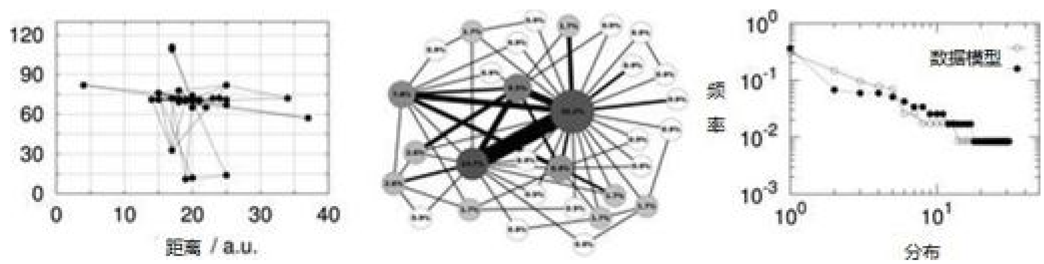


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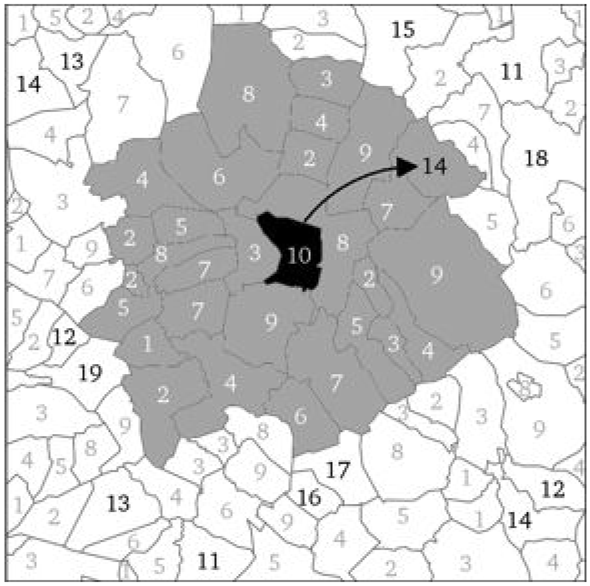
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$$\langle T_{ij}\rangle = T_i \frac{m_i n_j}{(m_i+s_{ij})(m_i+n_j+s_{ij})}, \qquad (3)$$

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□□$T_i \equiv \sum_{i\neq j} T_{ij}$□□□□□i□□□□□□□□□□□□□□$N_c$□□□□□□□□□□□□□□□□□□□

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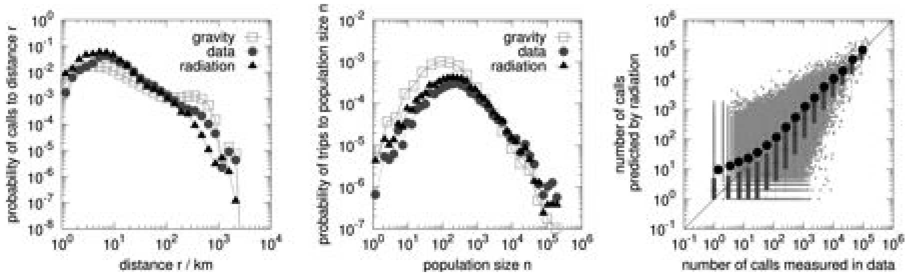
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$$T_{ij}=\frac{m_i^{\alpha} n_j^{\beta}}{f\left(r_{ij}\right)}, \qquad (4)$$

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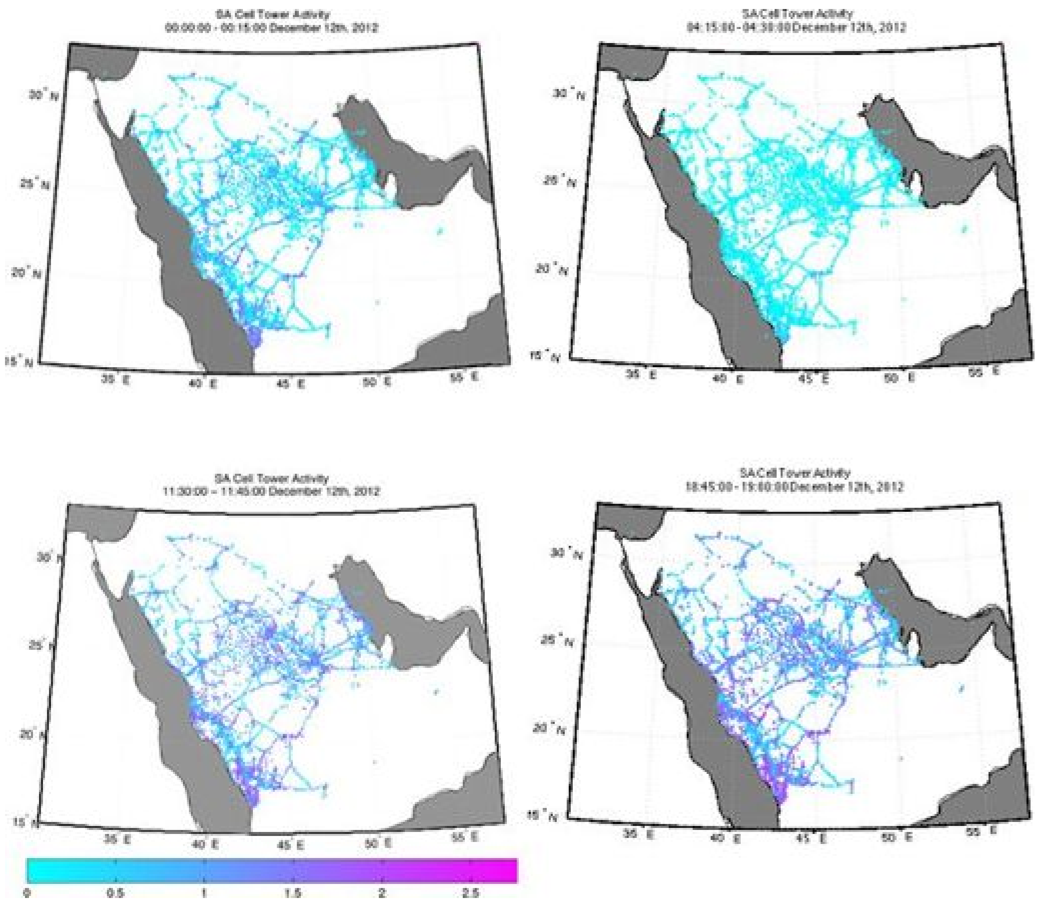
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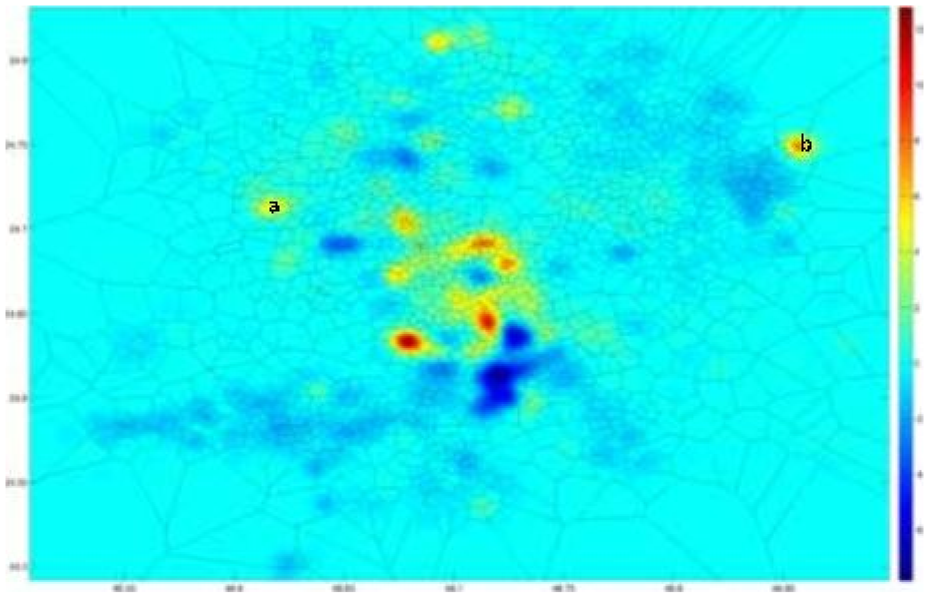
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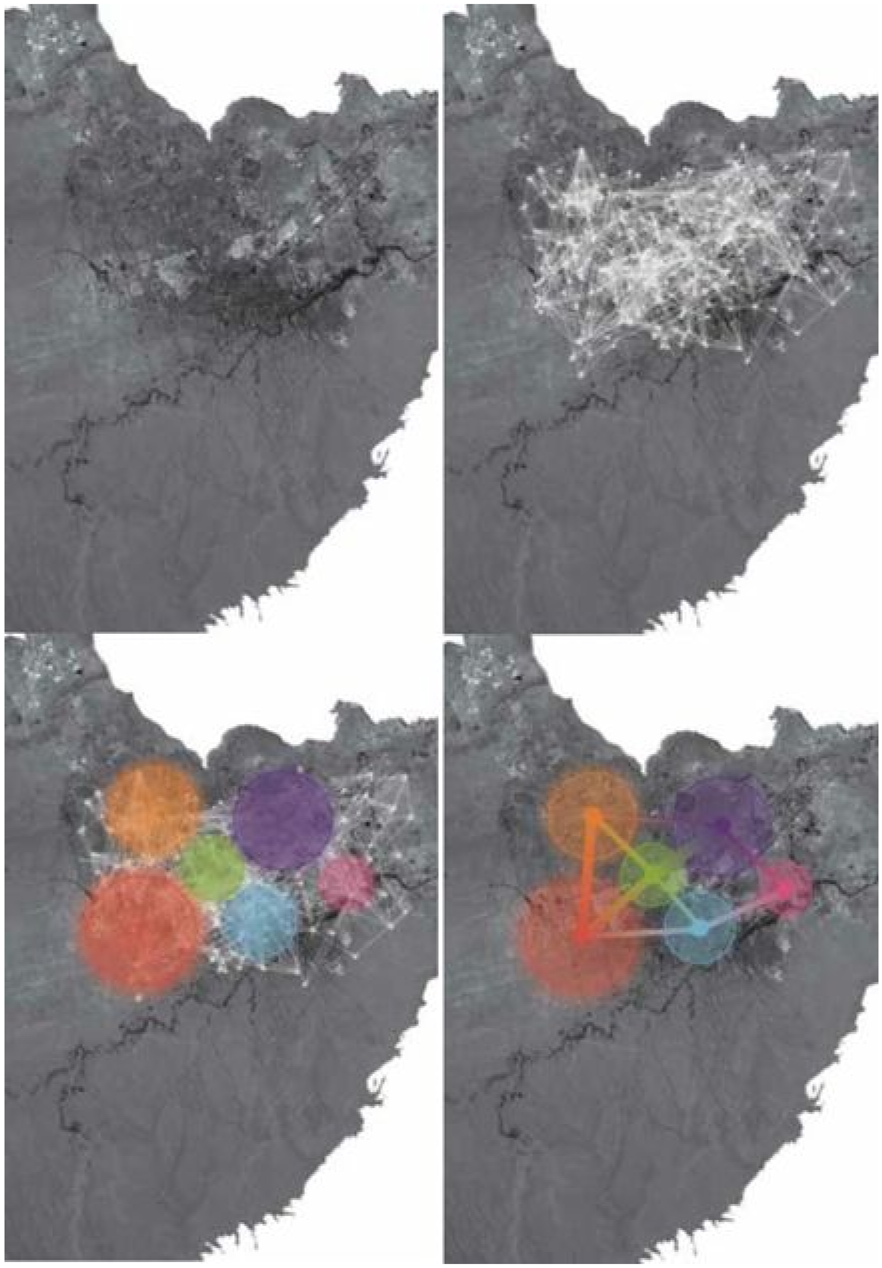
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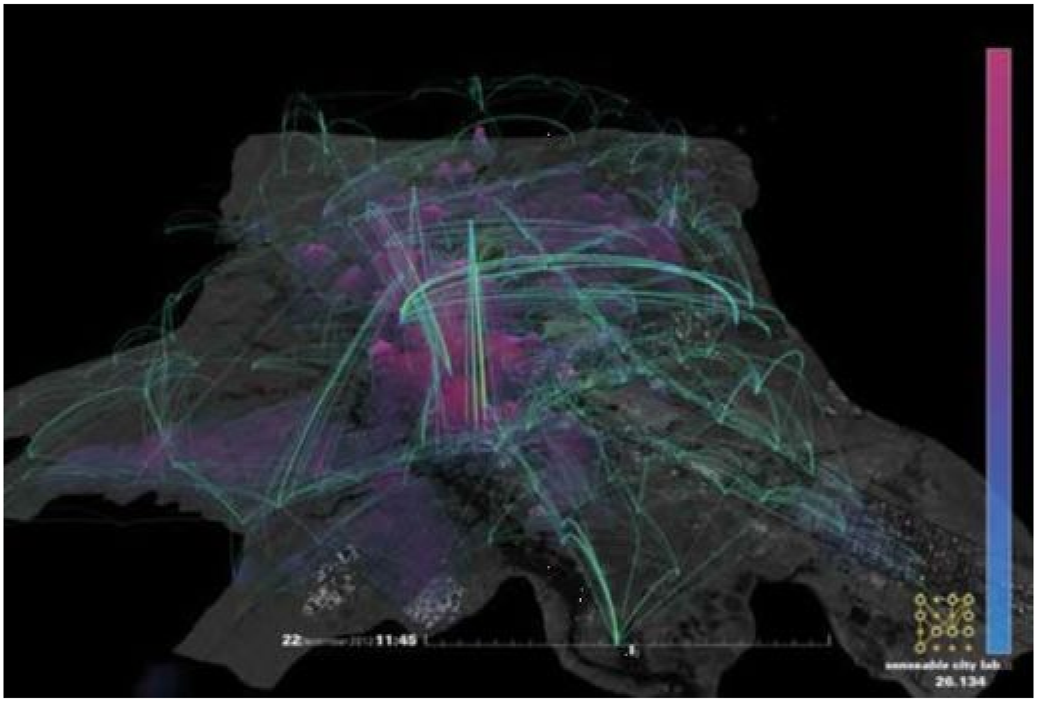
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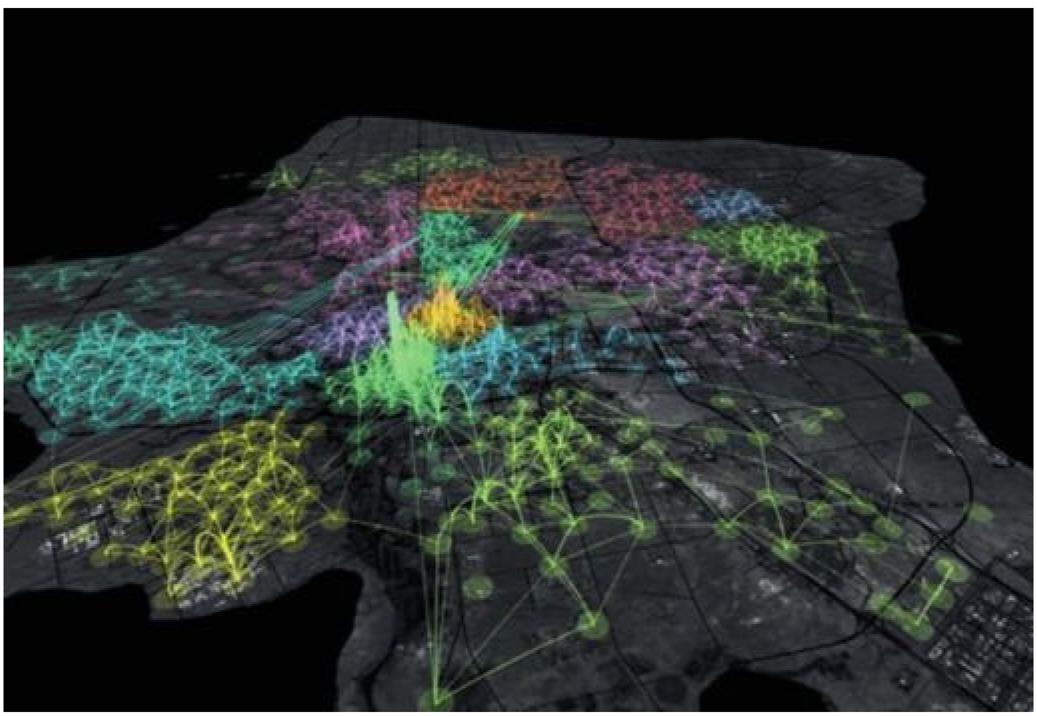


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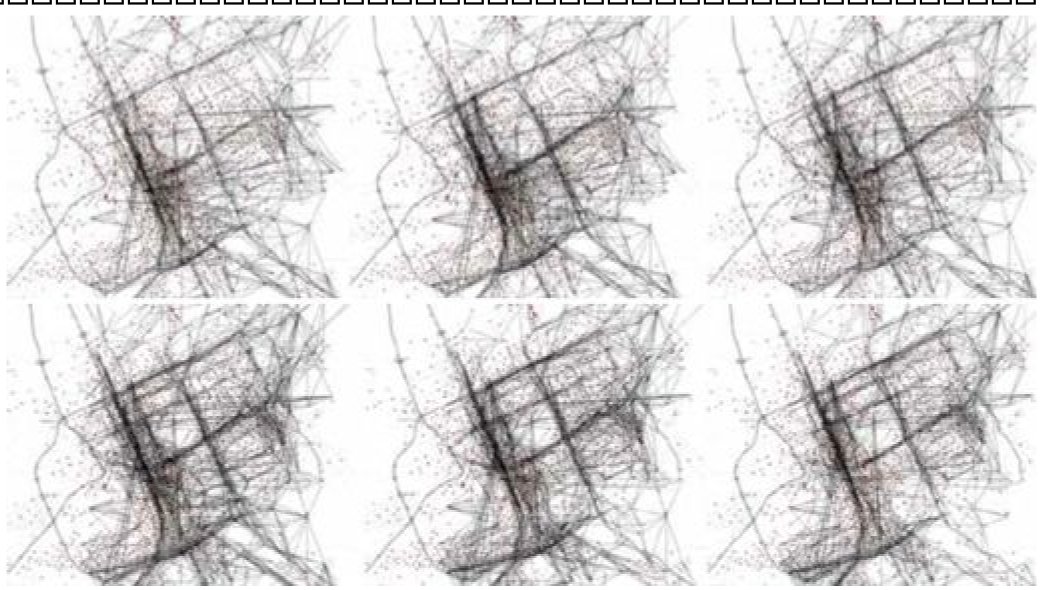
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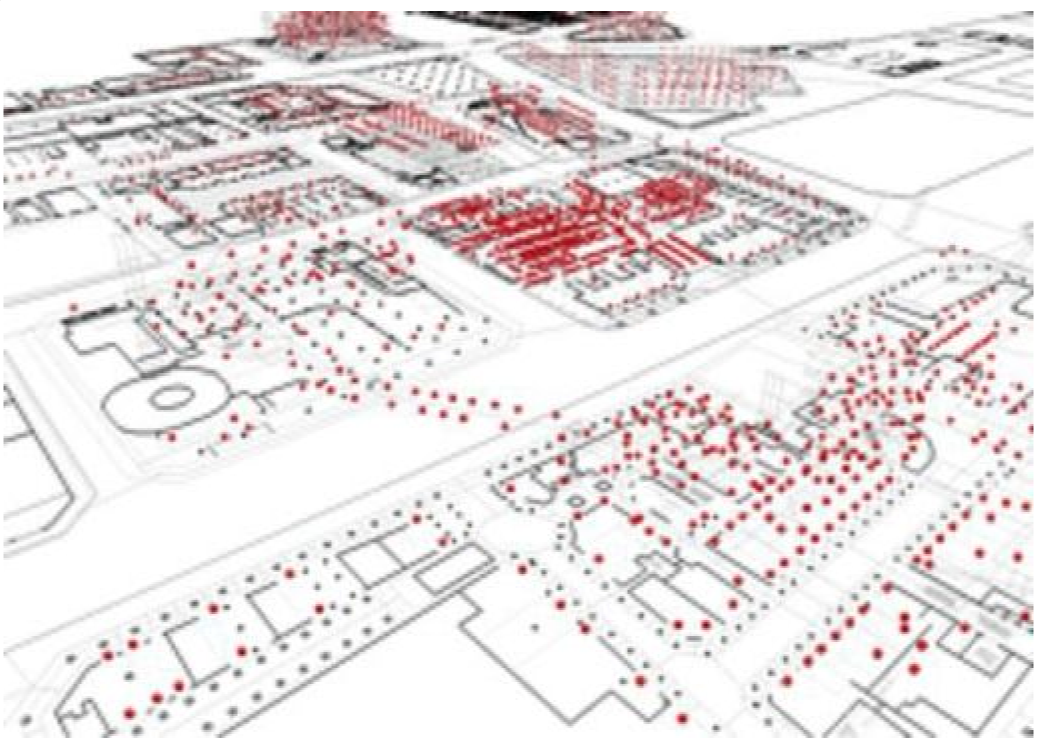
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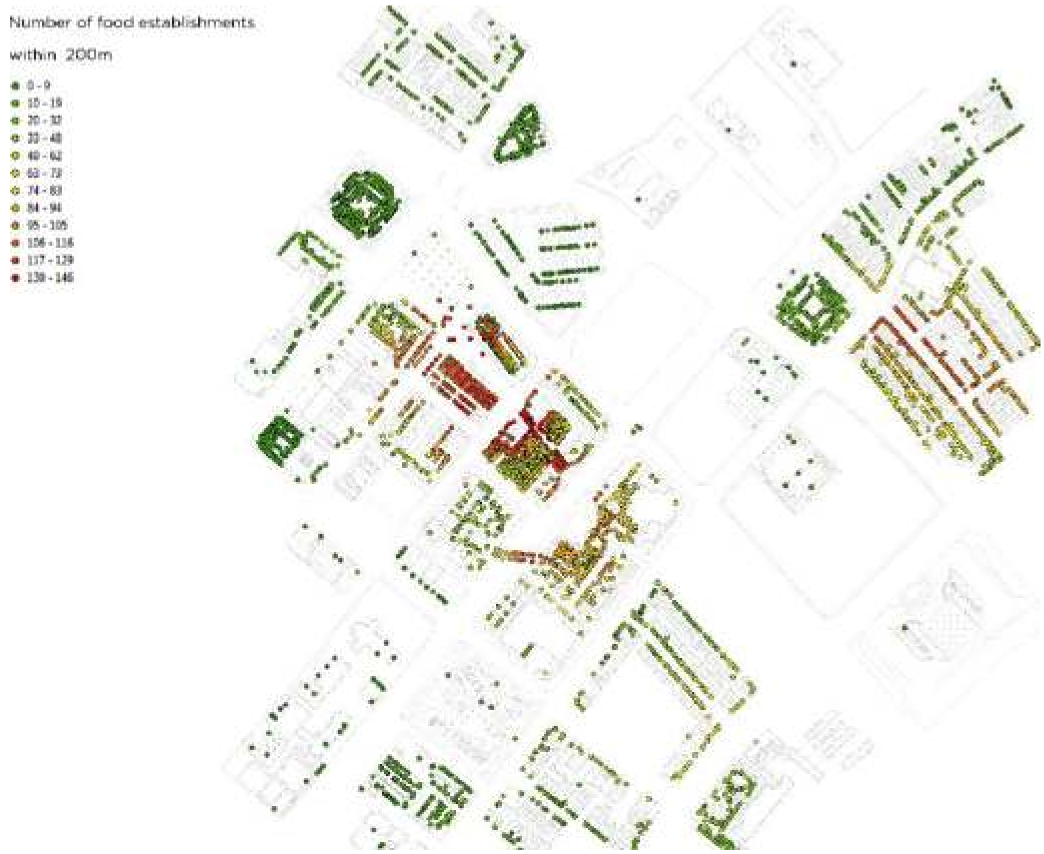
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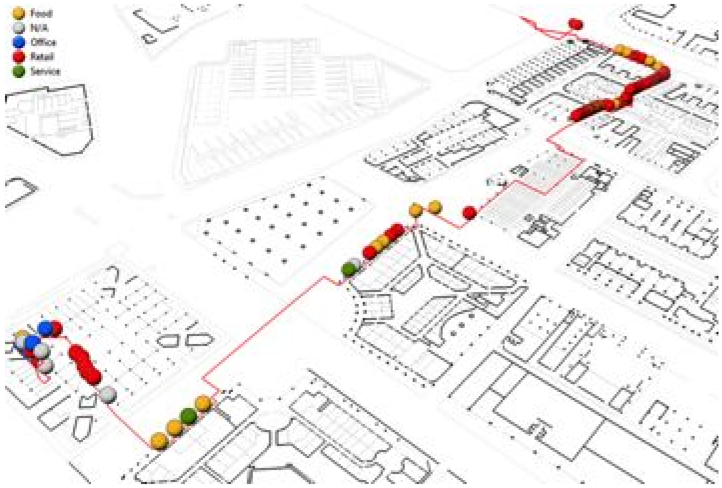
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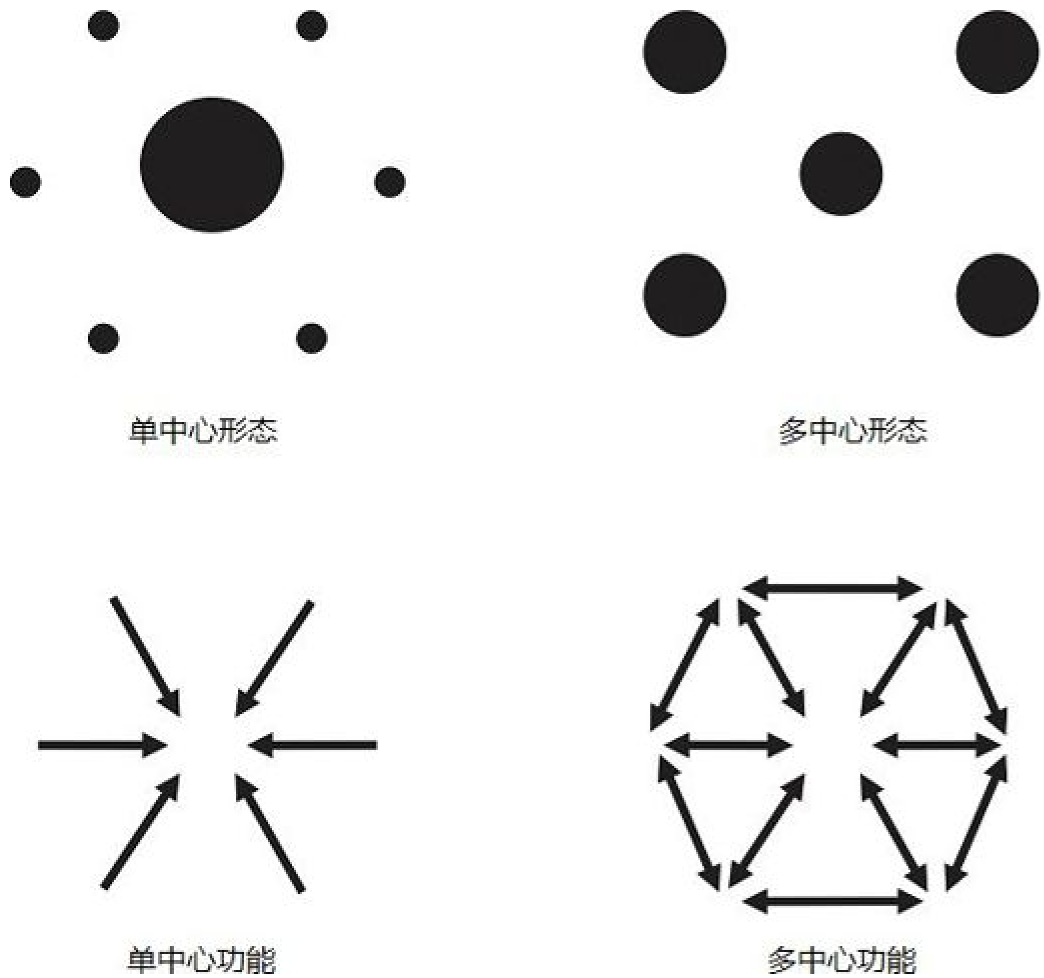
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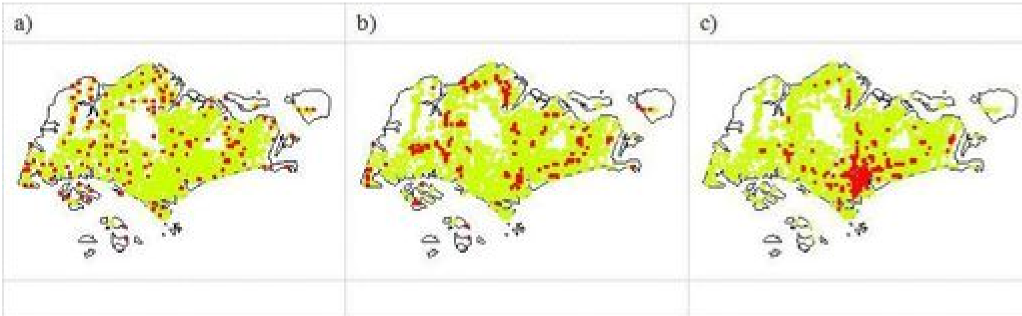


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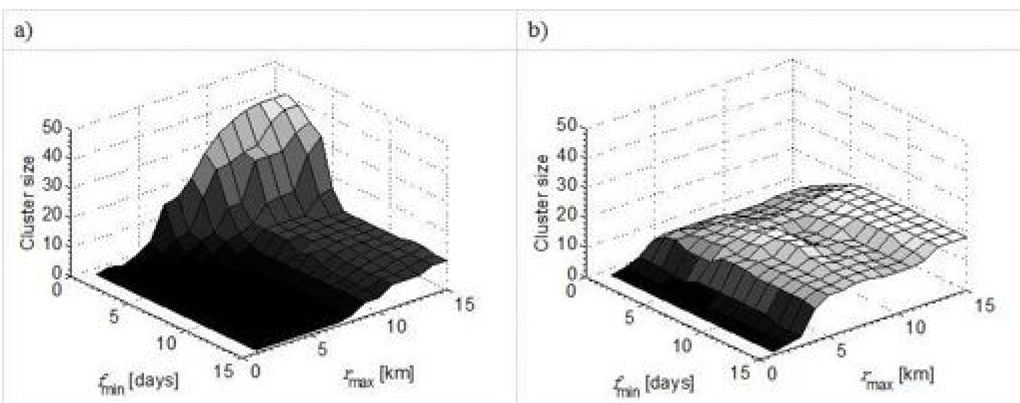
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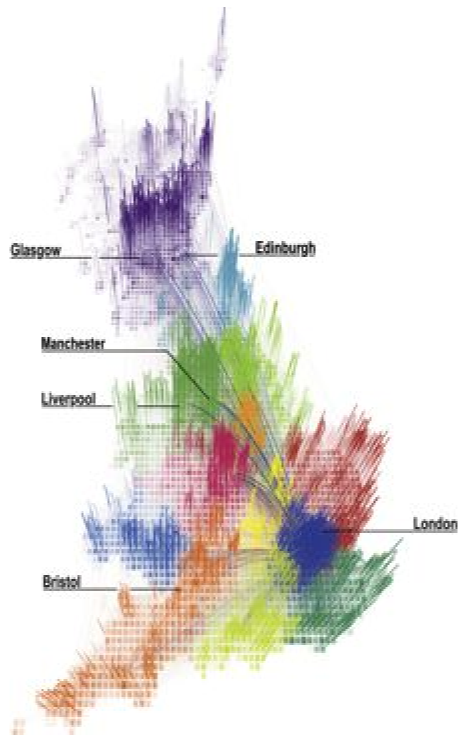
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